

# COMPUTERWORLD

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NEWSPAPER



CW Photo by R. Frank



CW Photo by M. Upton

Some played games as others crowded into technical sessions at the International Federation for Information Processing Congress 77 in Toronto last week. In top photo, play proceeded as 16 teams contended for the computer chess crown.

## Koreans Hit in Theft Of Millions in GI Gear

By Edith Holmes  
CW Staff

WASHINGTON, D.C. — A Retired U.S. Army officer charged here recently that South Koreans, with the help of Americans and a computer system, have been stealing up to \$17 million in U.S. food, uniforms, vehicle parts and other supplies each year since the early 1970s.

The diversion of American supplies continues today "at the same or slightly reduced level," Lindsay L. Baird Jr., a retired lieutenant colonel who served a year as provost marshal for the Army's Second Infantry Division in Korea, said in a letter to the Senate's Committee on Government Operations.

In response to the publication of Baird's five-page letter in *The New York Times*, the Department of Defense (DOD) elaborated on its mid-July comment that it was "investigating alleged improprieties in South Korea."

DOD's overall inquiry will include an examination of Baird's charges, a DOD spokesman added last week.

According to Baird, Korean organized crime, the Korean military and Korean contractors, politicians and police — as well as American enlisted men — had a hand in the manipulation of the U.S. Army's inventory control, centered at Taegu, Korea.

### Koreans Used U.S. System

South Koreans used the Army's logistics system, which runs on a Univac 7060, to order, move and store at convenient locations items earmarked for theft, Baird said in his letter and in an interview with the *Times*. When the property was stolen, records of its existence vanished.

Food was stolen every Monday, Wednesday and Friday and, in one instance, \$103,000 worth of field uniforms was diverted, the former provost marshal reported.

The Korean railroad billed the Army for goods that had not actually been transported or for materials that had been moved but not recorded on bills of lading because they were "destined to be stolen at the final destination," Baird said.

Baird, who retired from the Army in 1973, served as provost marshal for the Second Infantry Division from mid-1971 to mid-1972. He was in charge of a larceny squad that looked into theft and corruption in Korea.

The Army has investigated the matter in the past, he stated. In late 1971, a meeting of top Army officials put U.S. supply losses in Korea at \$27 million to \$28 million a year, he added.

Control procedures were established and more Americans were assigned to the Taegu computer center, he said. The Taegu operation, however, was "primarily staffed with Koreans who

(Continued on Page 4)

## Ifip Congress Draws Global Crowd

### Toronto Trip Real Challenge

By Molly Upton  
CW Staff

TORONTO — Getting here was half the fun.

Ingenuity and perseverance were the two traits required by many attendees of the International Federation for Information Processing's (Ifip) Congress 77 as an air traffic controllers' strike closed all Canadian airports the day before the conference started.

Attendees could be divided into two classes: those who had problems traveling to Toronto and those who didn't.

And then there were those who didn't arrive at all. The Ifip organizing committee indicated there were about 200 persons who had preregistered but not arrived as of last Wednesday.

The conference proceeded largely as scheduled, with only a few papers assigned a later time for presentation.

Although many of the attendees from Europe were already in North America before the strike began a week ago Sunday, some still had to exercise their ingenuity to reach Toronto. Those who learned of the strike while in transit faced nightmarish reroutings involving trips of up to 35 hours.

Hans Kristia Eckhoff of Rogaland-data AS in Stavanger, Norway, said he

(Continued on Page 6)

### 50 Nations Represented

By Ronald A. Frank  
CW Staff

TORONTO — The sixth triennial congress of the International Federation for Information Processing (Ifip) here last week attracted about 9,000 DP professionals from all over the world.

Delegates from more than 50 countries attended the technical program, which included 100 papers, 90 sessions and 30 mini symposia and panel discussions. More than 20 international authorities on computing presented invited papers as part of the technical program.

The Congress 77 exhibition featured over 100 companies, research agencies and other DP organizations displaying their products and services. Congress 77 also included the Second International Medinfo Conference dealing with the use of computing and medicine and the second world computer chess championship tournament.

The Ifip Congress in Toronto marked the second time the international conference, founded in 1962, has been held in North America; the first was held in New York in 1965.

Social issues received considerable attention at the conference late in the

(Continued on Page 6)

### Controls Urged On Technology

By Nancy French  
CW Staff

TORONTO — Computers are the engines of social, economic and industrial change because of the potential they unlock wherever they are applied, Josef Kates said here last week during opening ceremonies for the International Federation for Information Processing's (Ifip) Congress 77.

Kates, who heads the Science Council

(Continued on Page 6)

## Mass. Nixes EDS Contract

By Ann Dooley  
CW Staff

BOSTON — Contract negotiations between the state of Massachusetts and Electronic Data Systems (EDS) ended here last week, after Gov. Michael S. Dukakis intervened to halt the dispute over a \$23 million state contract.

The contract involves a five-year facilities management agreement to reorganize and expand the Department of Administration and Finance (A&F).

The controversy erupted when it was discovered that two officials of Sci-Tek Associates, a Massachusetts firm, were on the contract selection commit-

tee at the same time Sci-Tek was working with EDS on a \$1.6 million contract in Tennessee.

Dukakis called a halt to the negotiations after an advisory opinion by Attorney General Francis X. Bellotti found Sci-Tek's double role in the EDS selection and its involvement with EDS in Tennessee apparently violated state conflict-of-interest laws. The investigation was done at the request of A&F Secretary John R. Buckley, whose office conducted the selection process.

The governor said the contract to computerize the state's budgetary, accounting and payroll records is "too

(Continued on Page 5)





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Please address all correspondence to the appropriate department at 797 Washington Street, Newton, Mass. 02160. Phone: (617) 965-5800. Telex: USA-92-2529

**OTHER EDITORIAL OFFICES:** England: Computerworld Publishing Ltd., 140-146 Camden Street, London NW1 9PF. Phone: (01) 485-2248/9; Telex: 264737. **W. Germany:** Computerworld, c/o Computerwoche GmbH, 8000 Munchen 40, Tristansstrasse 11. Phone: 36-40-36/37; Telex: 5215350. **Asia:** Computerworld, c/o Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone: (03) 445-6101. Telex: J2424461.

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## But What Policy?

## Lance: OTP to Retain Policy Role

By Edith Holmes  
CW Staff

WASHINGTON, D.C. — The Office of Telecommunications Policy (OTP) will continue to have a role in telecommunications "policy development" after it moves out of the White House and into the commerce department under President Carter's federal reorganization plan, Bert Lance, director of the Office of Management and Budget (OMB), said at hearings here recently.

But Lance did not specify what areas that policy development would cover, and that left Capitol Hill observers divided on the import of his statement.

Some felt Lance meant OTP will continue to provide policy guidance in the same areas it has in the past — the structure of the communications industry, regulatory policy regarding common carriers and regulatory approaches to new technologies.

Others, including Sen. Ernest Hollings (D-S.C.), and Rep. Lionel Van Deerlin (D-Calif.) — believe Lance's remarks supporting "Reorganization Plan No. 1" contained no positive statement of the functions OTP will perform under an Assistant Secretary for Communications and Information in the Commerce Department.

## Shouldn't Worry

Informal Meetings between the White House and Congress suggest the Senate Subcommittee on Communications, chaired by Hollings, shouldn't worry about the continued importance attached to OTP, communications and information policy, a subcommittee spokeswoman said.

"But we're still waiting to see something on paper from the White House," she added.

One reason Lance gave for moving OTP from the White House to Commerce was considered both "ominous" and vague by at least one observer. "The functions of OTP are important, but, as presently performed, do not require Presidential attention," the OMB

director stated.

Appearing before the House Government Operations Committee's Subcommittee on Legislation and National Security earlier this month, Lance repeated the President's statement that, with the exception of the federal government's procurement of telecommunications facilities and services, agency squabbles over allocations of the radio spectrum and policy options requiring Presidential decisions, OTP will take "all other functions" with it to the Commerce Department.

Those "other functions" include communications "policy development and the allocation and regulation of frequency assignments," he said.

## OTP's Origins

OTP came into being with former President Nixon's 1970 reorganization plan and had its functions specified in Executive Order 11556 of Sept. 4, 1970. The U.S. Government Manual describes OTP's functions from that point on as developing policy in such areas as communications industry structure; communications goals in international negotiations; common carrier services; and new technologies, including satellites, cable television and interconnection of computer systems.

Optimistic observers believe Lance's reference to "other functions" in his presentation to the House subcommittee, chaired by Rep. Jack Brooks (D-Texas), suggested OTP will continue to carry out these tasks as part of Commerce.

They also expect the telecommunications organization will still establish policies and standards for federal communications systems and guide the government's research and development efforts in this area, as discussed in the federal manual.

The President had already stated that under an Assistant Secretary for Communications and Information in the Commerce Department, the reorganized OTP would continue as the Administration's spokesman on

telecommunications and would still assess the economic consequences of "information policy" [CW, July 25].

Lance confirmed that Assistant Secretary position will be a new post, separate from Commerce's Assistant Secretary for Science and Technology. He also stated that those OTP functions transferred to Commerce will be merged with the Department's Office of Telecommunications.

The OMB director explained that the President views the transfer of OTP responsibilities to Commerce as a consolidation of the treatment of telecommunications issues within one agency.

"The designation of a new Assistant Secretary would signal the importance of telecommunications issues within Commerce and provide a single spokesman for telecommunications issues within the Administration," he told Brooks and the subcommittee.

"Additionally, the growth of the information section of the economy, the expansion of telecommunications and DP technology and the creation of new industries in this area make it essential that economic consequences of information policy be adequately assessed," Lance said.

The transfer of OTP functions to the Commerce Department is consistent with Carter's commitment to strengthening Cabinet government, he noted.

Fianlly, Lance contended that OMB's role in computer and information system procurement makes it appropriate that the budget agency take on telecommunications procurement as well. OBM "provides a neutral home for this function," he said.

Brooks noted in his opening statement that Carter has until Sept. 15 to change or clarify his plan. Under the requirements of the Reorganization Act, which gives the President reorganization powers, Brooks has introduced House Resolution 688 expressing disapproval of Carter's first plan.

## On the Inside This Week

## NEWS

Micro Programmers Seen Facing Old Problems	4
Exhibit Features International Packet Net Link	5
U.S. Team Captures World DP Chess Crown	7
Much Memory for Little Money Predicted Soon	8
Transnational Processing Cited as Canadian Bane	10
DPMA Position Paper Rejects Software Taxation	13
DP Donations to Patients' Care Called Small	14
Prowse: Hospitals Giving Birth to Mini Boom	15

## EDITORIAL

Editorial: A Comforting Thought	16
Human Connection: What's a User to Do?	17
Taylor Report: Readers Eye Criteria for List Sales	17

## SOFTWARE &amp; SERVICES

Etos Creates Virtual PDP-8	19
'Politics' Must Play Part in DBMS Selection	20
Module of Month Plan Has Language Option	21

## COMMUNICATIONS

SNA Survival Short, Expert Predicts	23
Computerized Switch Optimizes Phone Net	23
Multiterminal Packet Net Being Built in Netherlands	25

## SYSTEMS &amp; PERIPHERALS

Clean Design Ends 'Powerful' Problems	27
CMC Changes Leasing Policy	27
Printer Configures System to Create Total Pages	30

## MINIWORLD

Two Minis 'Express' Data to Truckers	31
Adding OCR to Mini Speeds Remittance Task	32
DEC Users Get Clock Boards	33

## MICROCOMPUTING

Report From Datapro Details 144 Micros	35
Altair 680B, 8800B Prices Cut	35
System Allows S-100 Vocal Input	36

## COMPUTER INDUSTRY

Microcode Seen Future Market Strategy	37
Study Finds SBS-Type Ventures Capital-Intensive	38
Capital Investment Funds Scarce, Congress Told	39
OEM Products: Sweda Expands Paper Tape Line	40



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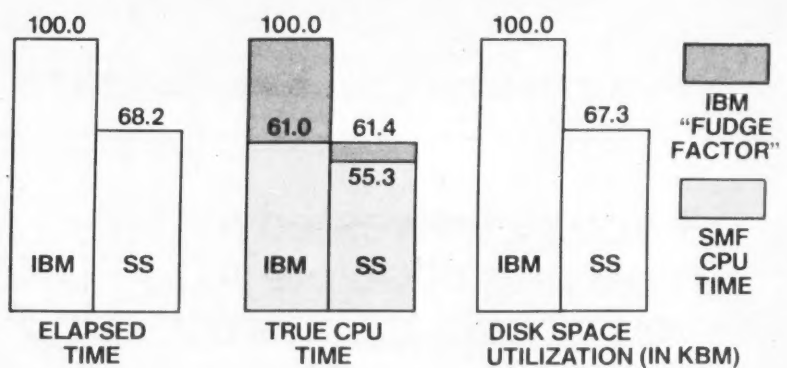
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| 7 General Electric     | 14 Eastman Kodak        |
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# Micro Programmers Seen Facing Old Problems

By Molly Upton  
CW Staff

TORONTO — Programmers of microcomputers are being asked to leap backward 25 years and repeat all the mistakes of the early programmers, E. Dijkstra told the International Federation for Information Processing's (Ifip) Congress 77 here last week.

"Microcomputers are not great," Dijkstra stated at a session entitled "The Impact of Microcomputers on Computing," attended by about 800.

Just as programmers once struggled with early computers to squeeze as much as possible out of the limited-capacity machines — when "all dirty tricks were permitted," — so today's programmers of microcomputers are struggling, Dijkstra said.

Eventually programmers learned that "good taste and a systematic mind"

were greater assets than the initiative to take short cuts since these traits resulted in greater reliability, he said.

Citing the "confusing nature" of computing, Dijkstra said a quarter of a century ago "we were told computers were great because they were expensive. Now we are told micros are great because they are cheap."

Dijkstra however, raised several concerns about micros, among them the problem of deciding how to distribute the computing load over a large number of processors and the problem of organizing different processors.

"With micros, users should be prepared for 'very unreliable output,'" he said. "Even if the design is flawless, how can we convince ourselves the quality control is really there?"

He expects the chip manufacturers to adopt the same philosophy as the auto makers: Leave the quality control to

the consumer. "We are forced to assume the chip is perfect unless the customer complains," he said.

## Multiple Micros Urged

Dave Aspinall of Great Britain advocated the use of multiple micros in a system, but admitted it will be quite a while before supercomputer design efforts are impacted by the large-scale integration (LSI) type of device.

Rather than devising a monolithic, sequential device, designers should admit micros are cheap, use lots of them and connect them properly to achieve a solution, he said.

His analogy between a percussionist in an orchestra and a dedicated micro — "a composer doesn't worry that the percussionist is idle most of the time" — drew hearty laughter from the audience.

Anatole Holt, director of research at Massachusetts Computer Associates, explained the user's view of micro as a remarkably cheap, remarkably portable unit with substantial informational power is causing the user to want to eliminate the expensive middle person, the programmer, and use it directly.

## Concern Over Standards

I. Barron of Microcomputer Analysts Ltd., chairman of the session, urged the computer industry to be very concerned with the evolving standards

and architecture of microprocessors.

Although micros are "poorly designed, inefficient in their use of storage and difficult to use," the trend is toward increased use of them, he said.

Barron pointed to the "clear momentum to standardize" micros and indicated time is running short before "fossilization" sets in. "Does it matter to the computer industry what the microprocessor looks like?" he asked.

His opinion was a definitive yes, citing how the industry had become stuck with the teletypewriter, an inappropriate, slow device whose use was pervasive because of its cost.

Barron expressed fear that the semiconductor manufacturers will implement longer word lengths rather than better architectures. What is really needed is a 4- or 5-bit word length, he said.

The 8-bit word length is "very silly" and very inefficient for representing the sort of information we use — English with some numbers, he said. A more effective coding system using a character set of 4 or 5 bits could halve the cost of electronics, he added.

Citing the demand for simplicity and clarity in computing, Barron said a 30% to 40% reduction in the size of programs might be possible if one went directly to a microprocessor that accepts high-level language.

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## Koreans Charged in Theft

(Continued from Page 1)

were supervised by a relatively small number of Americans."

"The Koreans knew everything about the systems while our people did not," he wrote.

The Army's own logistics system facilitated the rip-off of the computerized inventory, Baird said. Under Army procedures, as goods move from one point to the next, the main responsibility for keeping records on them moves with them. The lack of compre-

hensive records in some other location made it easier for the crime ring to develop false records at Taegu, he explained.

In other instances, Baird said, the computer system was simply used by the Koreans as a source of information about the size, destination and contents of supply shipments.

Baird, now a DP consultant to private industry, wrote to the senate committee after it published its staff report on computer crime entitled "Problems Associated With Computer Technology in Federal Programs and Private Industry," early this year.

At the end of June, as a result of the staff study and hearings held by the Senate Government Operations Committee, Sen. Abraham A. Ribicoff (D-Conn.) introduced a computer abuse control bill designed to levy heavy prison terms and fines on criminals using computers to steal or manipulate information [CW, July 4].

A companion bill has since been introduced in the House of Representatives by Representatives Charles Rose (D-N.C.) and Robert Drinan (D-Mass.).

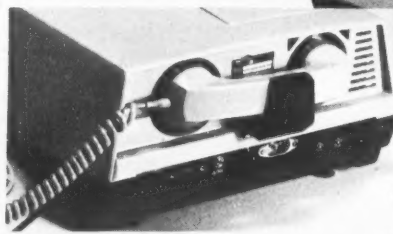
The Senate Government Operations Committee plans no further investigations into computer crime — including the alleged South Korean thefts — at the present time. "The investigation is already completed, and we have demonstrated a need for computer crime laws," a spokesman for Ribicoff stated.

The key issue in the Baird account of the Korean thefts is not computers, but spare parts, he continued. "That's the real scandal."

A spokesman for the Korean Embassy here said the Baird allegations were "malicious lies not worthy of further comment."

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## X.25 Protocol Used Exhibit Features International Pack Net Link

By Ronald A. Frank  
CW Staff

TORONTO — The international interconnection of packet-switched communications networks was demonstrated as an operational reality here last week at the International Federation for Information Processing's (Ifip) Congress 77.

The exhibition featured a transatlantic link between the Canadian Datapac network and the French RCP net. The interconnection was implemented using the X.25 protocol recently approved by the Consultative Committee on Interactive Telephone and Telegraph (CCITT).

The demonstration was the result of a cooperative interface between the

French Postal, Telephone and Telegraph (CPIT) authority, Teleglobe Canada and the computer communications group of the Trans-Canada Telephone System.

CRTs from Honeywell Information Systems, Inc., Westinghouse, General Electric and others on the exhibit floor were connected to the Datapac net elsewhere in Toronto. Messages were transmitted over the Datapac net to an X.25-compatible gateway set up by Teleglobe Canada.

From the Teleglobe interface, another gateway was established by the French PTT which also interconnected with the RCP network.

In one international connection, Derek Barber, director of the European

Informatics Network (EIN), sent a message to his office in England by interfacing four major packet networks. From a CRT at the exhibition, Barber

and Iria, the French research institute, demonstrated several applications on the Cyclade network, which utilizes the Cigale system as its packet-switched transmission medium.

The Cyclade applications shown at the exhibition included a chemical data bank called Thermodata running on an IBM 360/67; Santal, a data base developed with the French Red Cross to compile information about hemophiliacs; a documentation system of the European Space Agency running on a 360/65 near Rome; and the Scrapbook file management system operating on the NPL network.

CII-Honeywell Bull participated in the Cyclade demonstrations with terminals connected to its DP center in Paris, where an HIS Series 60 Level 66 was operating. The company also used the terminals at the exhibition to access Iris 80 and Iris 50 systems installed at customer sites.

The French RCP network is the forerunner of the Transpac public packet network, which is scheduled to become operational next June. The Cyclade network, which became operational in 1973, currently serves scientific, academic and research users as well as government agencies in France.

French officials said it has not yet been determined whether a permanent interconnection will exist between Cyclade and Transpac.

### CW At Ifip

sent a message over Datapac and through the RCP net in France to an interconnection with the EIN system, which in turn was interfaced with the net of the National Physical Laboratory in Teddington, England.

The French PTT used the transatlantic link to demonstrate the RCP net

## Governor Calls Halt to EDS Bid Award

(Continued from Page 1)

important and too big a job to be tainted by any hint of conflict-of-interest."

A further investigation by a state advisory committee is continuing to "prove or disprove the existence of substantial violations" and to "determine whether further civil or criminal proceedings" are indicated, according to Bellotti.

Although the contract is being put out for new bids, Dukakis said Sci-Tek would play "no further role." To date, however, the small firm has obtained five other separate contracts from the state amounting to more than \$1 million.

James Corkery, co-owner of the firm, stated that an appearance of conflict of interest evolved because of delays in the Massachusetts contract selection process.

But the advisory committee found two of the delays occurred "because of the inability of Sci-Tek individuals to attend" selection committee meetings.

Sci-Tek official Robert Orr could not attend the final selection meeting since "he was in Memphis discussing the project there with Memphis officials

and an EDS representative," according to advisory committee reports.

During the first phase of the bidding, the EDS proposal was ranked lowest technically of five bidders, according to Bellotti. The EDS bid was also \$3 million higher than a proposed from Computer Sciences Corp., a competing bidder, according to the firm.

At some time in the selection process, EDS rose from last to first place, Bellotti said.

"The substantial improvement in EDS' rating by the Massachusetts selection board following the Memphis negotiations creates, at a minimum, an appearance of improper influence. Thus, even without a further investigation, the provisions of the conflict-of-interest law appear to be violated," he said.

The two Sci-Tek officials' actions "suggest possible violations of several criminal provisions of the conflict statute," he said.

The conflict of interest could be considered illegal "as long as EDS agreed to the subcontract arrangement in order to 'reward' Sci-Tek for the favorable Massachusetts vote," the advisory said.

"It is critical to ascertain whether EDS made some commitment to Sci-Tek... as a quid pro quo" on the state contract, according to the advisory committee.

"Evidence of an unmerited shift in EDS' rating" would indicate a violation, according to Bellotti.

The investigation will either prove "opportunity for collusion" or "that [the Sci-Tek officials] are guilty of nothing more than poor judgment in allowing the appearance of impropriety to flourish," he said.

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# Control Urged for Technology-Caused Change

(Continued from Page 1)

of Canada, a 25-member committee of university and industry representatives established to advise both government and industry, said all nations must give top priority to controlling the changes that flow from technological innovation.

It is necessary to anticipate the consequences as well as the potential of technological innovation and implementation, he said, adding that not all change is good and that today's boon may be tomorrow's disaster.

Although Kates characterized the computer revolution as "more benign" than perhaps the fast breeder reactor or recombinant DNA technology, he said it is critically important to understand the nature of the revolution that computers are creating, as well as what this means to individual countries and the world as a whole.

Computers have a bad image, he said, because people think they approach problems in a cold-blooded, calculating, mechanical way. While this view is unjustified, it does point to two important problems.

First, the public needs to be better informed about scientific developments; second, scientists and technologists have to take more seriously their responsibility to understand and to communicate to others the social, economic and philosophical implications of their

discoveries, Kates said.

Computer technology is already famous for the way it can replace human workers and thus contribute to improved industrial competition, he pointed out. However, those displaced workers sometimes find themselves unemployed and on welfare, so a clever application of computer science may have added nothing at all to the human estate, according to Kates.

There also has been a tremendous development of potentially important weapons such as data banks and computer models which have not been used to combat Canada's and other countries' economic problems, he said.

The phenomena of boom and bust, stagflation, regional disparities and so on are an enigma, although the productive potential to address them does exist, he said.

"It is clear the evolving new world order will be seriously affected by the extent to which countries control or own the technological know-how on which their economies depend," he said.

The largest industrial countries are bound to develop leadership positions in the new technologies. The small and middle power countries can still compete, but in highly specialized areas, he said.

Computers have already helped Canada develop its resources and

bring its population centers closer together with better communications, and computer technology can contribute much to the goal of saving energy, he said.

Some of this technology probably should be imported, but much can be improved here, too — developed for adaptation to Canadian conditions — such as the requirement for more heating and cooling, more transportation and communications and more energy for industries.

Canada is still in the process of nation-building and of creating the capability to play an effective, interdependent role in the world community. Innovations such as those in the computer field are perceived as engines of change that must contribute to this process.

The Science Council advocates "technological sovereignty" as the prescription for Canada's difficulties in ensuring an interdependent status in the global community, Kates said.

"Middle powers" like Canada can become more technologically interdependent by developments in



Josef Kates

software, which will lead to employment of a kind that challenges the intellectual abilities of a large portion of Canada's population.

The reduced dependence on capital investment that this involves, together with microprocessor technology and large-scale integrated circuitry, poses an exciting challenge to the large multinational companies that have so far dominated the computer industry.

## Toronto Trip a Challenge

(Continued from Page 1)

and about seven other Norwegians were notified of the strike by American Airlines at their hotel in New York City.

The only flight they could get was to Rochester, N.Y., where they rented two taxis and headed for Toronto. The taxi drivers had never been further than Buffalo, so Eckhoff did the navigating.

Rogalandsdata is a service center for municipal governments.

Dr. Filberti Fiumi of Siemens in Milan, Italy, arrived in Toronto Saturday, two days before the conference opened, and encountered no problems.

But Mieczyslaw Bazewicz of the Technical University in Wroclaw, Poland, was on a plane that was diverted to New York City. He was bussed to Toronto.

The journey took 24 hours and Bazewicz arrived at 1 P.M. last Monday, after the conference had opened.

Rolf Hoyer of the University of Goteborg, Sweden, arrived in New York City a week ago, last Thursday and drove as planned to Toronto in order to see some of the countryside.

Manfred Mall of Dornier System GmbH in Friedrichshafen, W. Germany had perhaps one of the most time-consuming journeys to Ifip. He started in Copenhagen 35 hours before reaching Toronto.

In London the airport was crowded with people standing around while planes were delayed. Mall arrived in Detroit at midnight Sunday and was bussed to Toronto, arriving at 7 A.M. Monday.

Carl Page of Michigan State University said he drove, as he had planned, from East Lansing.

Harold Borko of California said his wife had difficulty obtaining a flight from NYC to Buffalo. When she did, the bus from Buffalo blew a tire.

Robert Nell of the Saskatchewan Computer Utility in Regina, Canada, heard about the pending strike the night before it happened and arranged to start his journey with a flight from

Minot, N. Dakota that left at 6:20 A.M. on Sunday. He and some colleagues left Regina for Minot at midnight and arrived just in time for the plane because they had forgotten Minot's time is an hour earlier.

After a six-hour layover in Chicago, Nell arrived in Buffalo. But his problems were not over.

He boarded a very old bus which, after an hour or so of driving, headed back to Buffalo because neither the driver nor any of the passengers knew the way to Toronto. Nell arrived at his Toronto hotel at midnight Sunday, 24 hours after he started from Regina.

## Ifip Pulls 9,000 From 50 Nations

(Continued from Page 1)

week with five panel sessions covering such topics as the social accountability of computers, the impact of computerization on leisure activities and the erosion of privacy. Social issues related to computing first appeared on the Ifip program at Congress 74, held in Stockholm, Sweden.

The Congress 77 program also included a science theatre that presented movies and videotapes described as representative of the state of information processing today. The science theatre stressed the theme of Congress 77, "The Maturing Profession — Perspectives and Prospects."

Ifip is a federation of 34 national DP societies organized to promote information science and technology. During Congress 77, Pierre Bobillier of Switzerland was voted incoming Ifip president, replacing Richard Tanaka of the U.S.

Ifip Congress 80, the next meeting of the federation, will be jointly hosted by the Information Processing Society of Japan and the Australian Computer Society. Slated for October 1980, the first week of the conference will be held in Kyoto, Japan, and the second week in Melbourne, Australia.



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## U.S. Team Captures Crown As World DP Chess Champ

By Ronald A. Frank  
CW Staff

TORONTO — A U.S. chess team from Northwestern University became the new world champion last week after trouncing 15 other competitors at a tournament held as part of the International Federation for Information Processing (Ifip) Congress 77.

Playing on a Control Data Corp. Cyber 176 mainframe, programmers David Slate and Larry Atkin captured the crown with their Chess 4.6 entry.

The world chess competition began in 1974 at the Ifip Congress in Stockholm, Sweden, when the Russian program Kaissa came in first. Kaissa was written at the Institute for Systems Studies in Moscow by Dr. M.V. Donskoy and Dr. V. Arlazarov.

Opponents for these competitions are selected randomly and, for the second time in a row, Chess 4.6 and Kaissa were not matched against each other. However, the two competed in exhibi-

have come a long way in the last few years, Swets said it is doubtful the machines will ever play better than human experts.

Chess programs are commonly rated in Elo points, Swets said and the programs like Chess 4.6 and Kaissa are currently rated at about 1,800 points.

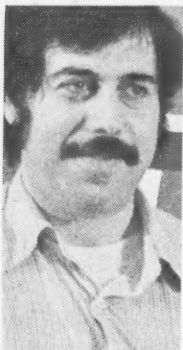
In a few years Swets believes the programs will have a rating of about 2,000 Elo points, but this is still below the level of a Grand Master, who would be rated at about 2,500 Elo points.

The chess programs play an erratic game, Swets said, but they take on the style of play favored by their authors as well as reflecting the playing habits of their countries.



CW Photos by R. Frank

Chess expert David Levy gives "play by play" during tournament.



Slate



Atkin

tion play Wednesday night, where Chess 4.6 defeated the Russian contender.

Chess 4.6 was programmed in Assembly language and contains a program of 7.5K words plus extended storage. The program contains an opening book of 5,600 positions, and the average number of positions examined per move is said to be 400,000.

The Russian program ran on an IBM 370/168 at Canada Systems Group in Toronto. Most of the other programs ran on CPUs in Canada or the U.S., with the exception of the West German entry, Elsa, which ran on a Telefunken TR440 in Munich using a data communications link supplied by Canada's I.P. Sharp Associates.

The English program, Master, ran on a 168 at Harwell in Britain, also using a data link supplied by I.P. Sharp.

One of the smallest processors in the tournament was a Digital Equipment Corp. PDP-11 used by the Belle program written at Bell Telephone Labs in New Jersey. Amdahl Corp. 470V/6 mainframes were used by teams from the University of Alberta, University of Toronto and University of Michigan.

The only individual entry in the tournament was the BS'66'76 program written by Barend Swets of The Netherlands. Swets played on a 370/168 using machine time donated by Datacrown Ltd.

The Dutch entrant wrote his program in 1966 when he was a computer science student at Delft University, but he has not been able to afford CPU time to work on BS'66'76 between championships, he said.

Although computer chess programs

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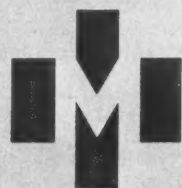
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## Will Ease CPU Limitations

# Much Memory for Little Money Predicted Soon

By Ronald A. Frank  
CW Staff

TORONTO — The time is not far off when a million words of very fast semiconductor memory will cost only a few thousand dollars, according to Prof. M.V. Wilkes, head of the computer laboratory at the University of Cambridge in England.

Speaking at an opening day session of Congress 77 sponsored by the International Federation of Information Processing (Ifip) here last week, Wilkes said today's CPUs are not short of processing power, but short of memory cycles.

This is shown by the fact that so-called multiprocessor configurations are nearly always dual-processor systems because two processors are sufficient to utilize the available memory cycles.

Additional processors may enable a higher level of fault tolerance, but they

will not materially improve the throughput. In a mainframe using a large number of microprocessors, therefore, much more money would be spent on the memory than on the microprocessors themselves, Wilkes told an audience of international attendees.

Microprocessors today are ideally suited for applications where the memory requirements are not great. These include the control of industrial processes and the control of computer peripherals.

But mainframe applications of microprocessors will have to wait until the cost of higher speed semiconductor memory has fallen dramatically, he said.

There are currently four levels of memory used in computer systems, according to Wilkes, who described them as archival memory utilizing magnetic tape; file storage using moving-head

disks; intermediate storage using drums or fixed-head disk; and high-speed memory using core or semiconductor technology.

The first, second and last of these levels have clear operational requirements while the intermediate storage "exists only for economic reasons." The limit of what can be handled effi-

## CW At Ifip

ciently in paging memories has been reached and even exceeded slightly with drums and fixed-head disks used for intermediate storage, he said.

For this reason, the development of a memory device with somewhat similar characteristics but much greater speed "would be instantly adopted by those



CW Photo by R. Frank

M.V. Wilkes

who are dissatisfied with the performance of their paging systems." Wilkes called this area "an immediate role for bubble memories or charge-coupled devices."

We are not very far from the point at which intermediate storage will disappear altogether, he said, adding this will happen as soon as the cost of high-speed semiconductor memory becomes low enough.

When this happens, paging as it is known today "will sink without a trace," Wilkes predicted.

But a single-level, high-speed memory containing one million words or more will present new problems. Programmers will want to have some sort of segmentation and this could well take the form of mapping the memory onto itself with the methods now employed to map a drum onto a smaller high-speed memory, Wilkes said.

This type of memory would constitute paging without having to wait for the associated time penalty when material is being transferred, he added.

The user is thus within sight of the compact computer having a processing power approaching that of modern mainframes with high-speed memory. The low cost of these machines will make them useful as stand-alone CPUs or building blocks for larger systems.

Few people would say that the stand-alone machine can meet all DP requirements because a central facility is needed for the permanent and semipermanent storage of information in bulk, Wilkes said.

But sheer possessiveness could lead a user to demand a computer in his own office. Further, when a central site is down, the user can continue to do whatever work is possible.

An argument for having a central site CPU is that there is better control and maintenance. In addition, some users require a CPU only on an infrequent basis and cannot justify a computer of their own.

For these reasons, service bureaus will continue to flourish regardless of what happens to the rest of the industry, Wilkes said.

Considering the various trade-offs between a user having an in-house CPU or using a DP center, a hybrid system may evolve in which users would be given the choice, Wilkes said.

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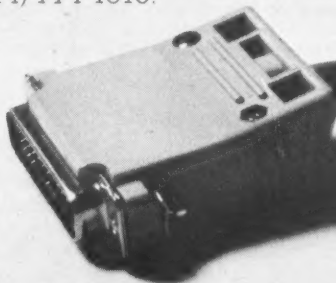
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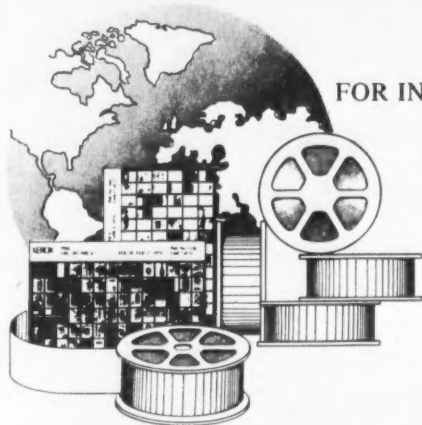


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## Transnational Processing Cited as Canadian Bane

By Nancy French  
CW Staff

TORONTO — The advances in teleprocessing that have enabled foreign-owned companies here to save money by processing their Canadian data outside the country have contributed to Canada's employment and balance of payments problems, according to Canada's Minister of State for Science and Technology.

Speaking at ceremonies that opened the International Federation for Information Processing (Ifip) Congress 77 here last week, J. Hugh Faulkner said the rapid advances in computer and telecommunications technology "have combined to accentuate the problems of national control of national destinies."

The importation of information processing services resulted in lost revenues of \$150 million to \$300 million in 1976, according to preliminary estimates developed by the Department of Communications. The rather imprecise estimates are a result of difficulties in definition as well as valuation, an aide to Faulkner explained.

Further, this practice has cost Canadians 30,000 to 40,000 jobs through either loss or lack of creation. Although these figures appeared in a draft version of Faulkner's speech, the minister deleted them for presentation.

Faulkner compared the problem to the "brain drain" of the late '40s and '50s, during which Canadian professionals educated in the government-funded university system emigrated to the U.S. and other countries where they could earn higher salaries.

### Growing Dependence

The problem of transnational data flow has "created the potential of growing dependence, rather than interdependence," and with it "the danger of loss of legitimate access to vital information and the danger that industrial and social development will largely be governed by the decisions of interest groups residing in another country," Faulkner said.

Acknowledging the concern of industry over attempts to curtail the free flow of information across national borders, he also noted how costly it would be to duplicate the large data banks required by science and industry and said there would be little to gain from such duplication.

However, he emphasized, that "national borders do exist — they are a fact of life and cannot be ignored by multinational corporations. The operation of such firms in other countries cannot be regarded as mere extensions and adjuncts to headquarters, similar to branch plants in their own country of origin."

As for the importance of international trade, Faulkner said he recognized that world progress is dependent on such commerce. However, there have been only a few short years in which it has been technically and economically feasible to import or export information-processing services.

"Here we are dealing with something intangible. You can't pick it up, you can't count it as it crosses an international boundary and most of it relates to intracorporate requirements rather than to something for sale in the



CW Photo by M. Upton

J. Hugh Faulkner

marketplace," he said.

"There is a growing need for international agreement on a generally acceptable set of ground rules for dealing with these perplexing problems," he said. "We are all 'developing' nations in the new information society, and solutions to these new problems can-

## CW At Ifip

not always be found in tradition or precedent."

### Passivity Diminished

To date society has been passive in its attitude toward advancing technologies, Faulkner said, which has led to a series of events which caused continuing and usually irreversible change.

"Unforeseen problems sometimes reduced government policies to a series of reflex reactions to unforeseen crises," he explained. He warned, however, that society is "no longer passive to advances in information processing because of the growing impact on the individual and because we have on our hands a revolution rather than an evolution."

As information is increasingly processed and stored remote from its place of origin, new approaches — nationally and internationally — will be needed if responsible jurisdictions are to protect the privacy of their citizens and ensure the right of their citizens to access all the information that should be available to them, he said.

Finally, Faulkner urged attendees to work to improve the relationship between computers and the man on the street.

Today the citizen gets little assistance when it comes to dealing with computers that send "dunning notices for payments of disputed charges and predated bills which arrive after the overdue date," for example. He blamed these problems on a "lack of acceptable standards to guide interactions between people and machines."

Faulkner praised the Canadian Information Processing Society for establishing an ombudsman service which provides a flexible and appropriate response to such complaints.



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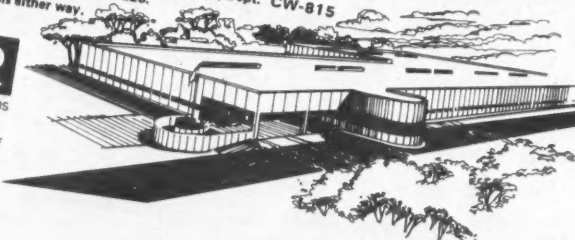
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## In Position Paper

## DPMA Rejects Software Taxation

PARK RIDGE, Ill.— The Data Processing Management Association (DPMA) has issued a position paper calling software an intangible personal service that should be accorded the same treatment under the law as services by other professions.

The position paper was issued in preparation for the society's coming campaign against software taxation.

The paper cited the definition issued by the Tennessee Supreme Court Commerce Union Bank vs. George Tidwell.

Software is "information and directions loaded into the machine which dictates different functions for the machine to perform. What triggers these functions are referred to broadly as 'programs' and are often accompanied by magnetic tapes and disks, punch cards, manuals, flow charts and expert engineering assistance to comprise what is known in the industry as computer software," the court stated.

The DPMA paper pointed out that any tangible property, if used, is an inconsequential element of intangible software because:

- "Said software may be entered into a computer directly or via telephone lines with no tangible personal property, with the identical result as if tangible property were used as the input communications medium."

- "Such communications media are merely intermediate input means of entering software into a computer on a one-time basis before it is

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The solar system is expected to be in operation by this fall.

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transformed into its intangible end state of binary pulses."

- Said tangible property, if any, is either destroyed or reused after being used to transfer the intangible information therein to the computer on a one-time basis, leaving instructions (program) and information (data) in the computer in the form of binary pulses as the intangible end state."

- "The value of said tangible property, if any, is small, 5% or less, in comparison to the value of said intangible software."

- "Any tangible property, if used, has virtually no value in itself. Any value is in the information, which is valuable only when read by the computer and transformed by the computer into its tangible end state of binary pulses."

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# TEXAS INSTRUMENTS.



## Although Financial Systems Strong DP Donation to Patients' Care Called Small

By Edith Holmes  
CW Staff

WASHINGTON, D.C. — Although computer technology has greatly improved patient billing, it has yet to contribute significantly to patient care, according to W. James Prowse, a partner with Touche, Ross & Co.

Addressing an OCR Users Association conference here recently, Prowse said there have been several highly technical computer applications to serve patient needs, but "most of the computing in the U.S. health care system today is concerned with hospital payroll and with the myriad artificial complexities of billing, accounts receivable and insurance claims processing."

The "silver bullet" that some physicians believe DP can be in the direct care of patients is a long way away, given the funding that research in this area receives — or doesn't receive, Prowse added.

Because funding for DP research in hospitals and similar health institutions tends to be spent on financial applications, Prowse believes it unlikely these organizations will pioneer any real progress in computers and patient care.

### Sophisticated Payroll

Many hospitals have sophisticated financial management systems which include programs for payroll, billing, accounts receivable, inventory control and general ledger maintenance. Accounts payable is a minor application in most hospitals, he said.

Those institutions with foresight are also using their financial systems to do cost accounting in an effort to understand what their costs actually are, Prowse said, noting this is "a very difficult area."

Not much has been done in hospitals in computerized operations management, he continued. Admission, discharge and census of patients as well as outpatient and emergency room registration may be automated, but usually support the billing and accounts receivable applications.

Some institutions have spent millions of dollars to automate the scheduling of hospital admissions, outpatient visits, operating rooms and plant and equipment maintenance, Prowse noted. So far, however, this application hasn't proved cost-effective; the hospital might as well have a person arranging the schedules for these tasks, he said.

Applications in patient care are interesting in themselves as well as in what they haven't achieved, Prowse said. Next to billing and accounting ap-

plications, computers have been used to the greatest extent in acquiring data on patients for analysis in a hospital's clinical labs, he stated.

In the data acquisition area, analog outputs for devices attached to the patient are converted to digital signals that can be analyzed by computer. Minicomputers play a large

role in these "Rube Goldberg-type devices," Prowse said.

Minis have made great strides in analyzing data in areas like biochemistry, hematology and physical medicine, he added. Reports from these systems can improve a hospital's quality assurance program and get the necessary information to the physician who is treating the

patient.

Other applications in the area of diagnosis of patient ills include computer-assisted diagnosis, diagnostic radiology report input and computer-assisted organ imaging. Chiefly research funded, these applications tend to be on-line through time-shared terminals, Prowse said.

Automated radiology reports have been designed to handle routine test results, for example, a negative chest X-ray. The area receiving more attention at the present time, however, is organ imaging, which requires a computer to produce images of a person's internal organs in readable form, Prowse explained.

(Continued on Page 15)





# Prowse: Hospitals Giving Birth to Mini Boom

By Edith Holmes  
CW Staff

WASHINGTON, D.C. — What does the future hold for the use of computers in health care?

More minicomputers everywhere, according to W. James Prowse, a partner with Touch, Ross & Co.

So far, minis are best suited to the needs of a variety of clinical applications, and more doctors will be able to come up

with the dollars needed to purchase these machines, Prowse told the OCR Users Association at a recent conference here that attracted over 300 people.

The proliferation of minis through the hospital or institutional health care setting will also make it harder on the managers of centralized DP shops to manage the computing going on in these organizations, he added.

In addition to predicting that minis will become more widespread in health care, Prowse expressed his belief that hospital information systems as a whole will become cost-effective.

Forcing this trend will be cheaper equipment as well as medical personnel who are less afraid to use these machines, thus eliminating the DP people who now provide the interface between doctors and

terminals, Prowse said.

There will also be more machine-to-machine billing, employing optical character recognition (OCR) as an interim step, he suggested. With the proliferation of minis in hospitals, Prowse contended insurance companies will take tapes and disks directly from these processors to do their own DP.

If national health insurance ever comes about — and

Prowse emphasized "if" — hospital computers will be released to perform more interesting tasks than the billing applications that consume all their time now. National health insurance would diminish the hospital's need to unravel the complexities of third-party billing that exist now, he added.

The health care business will see an opportunity to develop a national citizen medical record with impacts on patient care, public health and health service, he stated.

The development of such a medical record, however, would carry with it "mind-boggling problems of confidentiality and security," Prowse said.

## Digital introduces DECstation. A big computer system that's small enough for anyone.

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## Contribution Called Small

(Continued from Page 14)

All of these applications present something of a crisis for the hospital's DP department, which over the years has moved from a machine like an IBM 360 to an IBM 370. What does such a department do with all the organ imaging equipment that comes along? How does it handle the radiologist who suddenly wants a compiler of his own?

There are other application areas with which the DP department must now contend. Radiotherapy treatment planning — a technique designed to destroy a tumor — is a minicomputer-based, highly computational application.

The technique is difficult to perform with a time-sharing system; a hospital needs about \$60,000 worth of minis and peripherals for a system that isn't in use all the time, Prowse noted.

Blood banking is the solid patient treatment application on the books right now. A proven computer application to a medical problem, blood banks can be maintained on any kind of system, including traditional batch, Prowse said.

Computerized in-patient treatment includes the automated capture of a physician's orders and their transmission to various elements of the hospital, order editing of conflicting physician directions, computer-assisted preparation of nursing care plans, the transmission of some test results to nursing stations and computer-assisted preparation of patient management guidelines, he stated.

Monitoring of patients in the intensive care unit requires a minicomputer, which can be obtained off-the-shelf these days and simply substitutes for a nurse, Prowse added.



## Editorials

### A Comforting Thought

The use of computers in a society can be as useful or as esoteric as that society chooses to make it.

That not-so-startling idea is vividly emphasized in a recent *Time* magazine article that contrasted computer usage in the U.S. and the USSR.

According to an unnamed "Western cybernetics expert in Moscow," Americans have dealings "linked with a computer at least 10 times a day" while the average Russian comes in contact with a CPU "perhaps once every six months."

The article did not identify the expert who made this value judgment, nor did it explain how the expert compiled the statistics.

Nevertheless, the comment illustrates the basic contrast between

computer use in the U.S. and the Soviet Union. Computer abuse and many of the problems that have been created in this country related to personal privacy are a direct result of the pervasive manner in which this society utilizes DP power.

The computer has been used in many ways to make life simpler and easier. The alternative approach is the one adopted in Russia, where the average person is rarely affected by computer systems.

It is true that problems and potential abuses come with the U.S. approach, but somehow it is more comforting to live with these problems, trying to solve them, than it is to keep the computer out of reach of the public.

### Bad Planning

There will be two microcomputing shows on the East Coast during the fourth week of August: Personal Computing '77 in Atlantic City, N.J., and Computermania in Boston.

While it is important to have shows in different parts of the country to reach the hobbyists who don't have the benefit of expense accounts, the thought of two significant shows being held during the same time frame is disturbing.

The microcomputing industry is a young one, and both the users and manufacturers are experiencing growing pains. Much of the marketing sophistication and polish that the IBMs, CDCs and NCRs have is nonexistent in the micro marketplace.

Also lacking is the hard cash to support multiple show locations. Companies that have just outgrown their infancy and are beginning to establish themselves with some degree of stability in a vibrant marketplace cannot afford to miss a single show — but they can't afford to

cover concurrent shows, either.

The user is also hurt by the conflicting show dates, for just as every vendor may not be able to exhibit at every show, the idea of coughing up hard cash to visit a show with fewer than anticipated vendors is a hard one to swallow.

The shows themselves are bound to get hurt. When the users and manufacturers recognize they are not getting full value for their money, they will undoubtedly seek other means of getting in touch with each other.

These conflicts in show dates are unhealthy for everyone concerned. It doesn't matter whose fault it is and it's unimportant what the underlying reasons are; what it comes down to is that such scheduling conflicts as the Boston/Atlantic City one show a degree of immaturity that casts a shadow on the entire industry.

Let's hope that clearer thinking guides the scheduling of future shows.

## Letters to the Editor

### Person First, DPer Second

Jack Stone's Aug. 8 column ["DPers 'Disconnected' From Family Life?"] certainly raised some provocative questions. In my opinion, however, the main problem lies with the attitude expressed by Stone and Painter Hoffman and, apparently, by others too.

I do not consider myself a "computer person." I am a person who happens to work with computers.

Once one starts thinking of oneself as a "blank person," with the blank being "computer," "doctor," "lawyer," "Indian chief," or whatever, it is naturally the "blank" that becomes the important title; the person part of it is subordinated.

Perhaps the best solution to the problem of dehumanization is for us all to think, act and refer to ourselves as people first and as DPers second, if at all.

David A. Schlesinger  
New London, Conn.

### Story Sensationalistic

I read with considerable dismay "CRTs Cause of Editors' Cataracts?" [CW, Aug. 1]. This article was a disgrace both regarding its implications on an important segment of the computer industry and in its overall lowering of *Computerworld's* editorial standards.

During the last 15 years, hundreds of thousands of CRT terminals have been shipped to users all over the world. Intensive use of these devices is commonplace in many industries, including transportation, insurance, manufacturing and publishing.

If these CRT devices are the cause of cataracts (or any other disease), I am sure there would be documentary evidence to that effect and it would have come to light years ago, during CRTs early field history.

Now we are confronted with an isolated situation to which *Computerworld* devoted front-page coverage, with the implication every CRT be provided with a label indicating that "Use of This Device May Be Hazardous to Health." In point of fact, the article admitted that a firm link between the cataracts and CRTs has yet to be established.

Consequently, I am sure many of us in the CRT industry are asking what the purpose of the article was other than sensationalism or the fact that CW may have been hard up for front-page news.

Articles of the type in question make *Computerworld* look like the *National Enquirer*. What little gained in sensational eye-stopping headlines will be lost along with CW's credibility as a serious industry trade journal.

John T.M. Pryke  
Product Marketing Manager  
Computek, Inc.  
Burlington, Mass.

### Where Did Pages 31-36 Go?

In the mail today, I received the Aug. 1 edition of *Computerworld*. On Page 1 was an article, bordered in black lines, boasting of the new computerized typesetting used in the issue.

As I was leafing through the paper, I noticed that the page numbers skipped from 30 to 37, at least in my copy. Were the page numbers assigned by computer, or were the pages left out of my copy, or what?

It certainly does not make a good impression for a computer industry newspaper to err like that.

Gary Rubin  
Rochester, N.Y.

There was no error. Postal regulations require us to number all "pages." A three-fold advertising insert, printed on all six sides, counted as pages 31-36. Ed.

## Data Past

### Five Years Ago Aug. 16, 1972

WHITE PLAINS, N.Y. — IBM 370 users with two or more 3330 disk drive spindles could save up to 73% on monthly rentals of IBM disk controllers with a series of options from IBM. IBM cautioned, however, that the options could result in degraded performance under some circumstances, since a user had first to get one or more Model 3333 units. The 3333s cost \$327/mo more than a standard two-spindle 3330.

SANTA MONICA, Calif. — Allied Computer Technology, Inc. introduced the Selectoplex Channel, a block multiplexer channel plug-compatible with the IBM 2860 selector channel. The company claimed the device could extend the life of large IBM 360s by three years.

### Eight Years Ago Aug. 20, 1969

IBM stated basically "What's yours is ours" in its contract with users for services of systems engineers. The contract stated "... [I]t is agreed that no idea, concept, know-how or technique relating to data processing shall be deemed confidential. To the contrary, IBM shall be free to use and disclose any such information during the course of this agreement and thereafter in any way which it may deem appropriate.

EAST NATICK, Mass. — Sylvania Electric Products, Inc. introduced a laser "tape drive" which made permanent recordings on 8mm film. The device had a peak packing density of 180,000 bit/in. and a recording rate of up to 21.6 million char./sec.





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# Keeping Up With DP: What's a User to Do?

By Jack Stone  
Special to CW

Juggernaut! The crunching, irresistible onslaught of the mighty forces of new computing technology moves ever onward, trampling over the programming innocents, the systems tyros and the user novitiates.

Yes, I bewail and bemoan, I suffer and sorrow, I ache and agonize. Why? Because I, too, dear reader, have been impacted.

You might well remark, "So what's new? We've all been hit with new announcements."

But I rejoin, "Yes, it's so easy to gloss over new generation announcements within the sanctum sanctorum of the computer center. It's much more difficult to accept a trouncing in the sharp(-shooting) spotlight of the public medium."

Here is my story:

Eons ago, I wrote of my discovery of THE ANSWER to THE MACHINE for programming concepts training [CW, June 6] which, incidentally, I adopted as my family's (nonalphabetic) computer system.

It was (and I write this most remorsefully) the Texas Instruments, Inc. SR-56 Key-Programmable Electronic Slide-Rule Calculator with Algebraic Operating System, for which I shelled out the nontrivial sum of \$79.95.

(If the truth be known, I purchased the machine as an item for my business, like any red-blooded American computer services entrepreneur, to obtain the tax write-off and with the intention of renting time on the machine to my kids for 10 cent/hour plus the cost of supplies and a one-time charge for documentation.

(Figuring three hour/day usage by these computer neophytes and a

five-day week, I could see my investment returning to me within the year, assuming that during the billing period my perspicacious offspring would not take a pickax to the chip to see what made it chirp.

("Like father, like son," they say. My offspring came back to me with a counter-proposition. They assembled a horde of their teenage roustabouts and obtained long-term commitments for the purchase of machine time based on volume purchasing.

(And they offered the time at 20 cent/hour list and 15 cent/hour in volume. We were in the process of negotiating a third-party lease when I went off to NCC '77 in mid-June and IT was announced.)

I first learned about IT while waiting for a conference bus in Dallas. I spotted an old friend who works for the CIA and we began chatting about personal computing. I proudly announced my recent acquisition of the "56" and he retorted, "My friend, what are you doing with that old junkpile? Do you also drive an Edsel?"

"The '56' is an archaeological relic to be enshrined in a time capsule, designed to tell folks in future years how it really was in the dawning days of computerism in American society."

I was shattered. My technical obsolescence was showing and I didn't even know it. I struggled valiantly to fight back.

"Hey, man, I just bought it last month. It's the latest and greatest, guaranteed!"

"No, man," he rejoined, "as technical giants go, you are the amazing shrinking man. THE calculator is the new TI Programmable 58, which has the solid-state 'bubble' program library facility."

"Now, wait a moment, here," I re-

sponded. "My salesman has been preprogrammed to contact me day or night in the event of a new announcement, and I have heard nothing."

"Of course you wouldn't, since announcement is not scheduled until this morning. You see, we've had 75

## The Human Connection

of our field agents, 23 of our overseas operatives and 122 clandestines following this technology development very closely. There is just no way we are not going to be number one... NUMERO UNO... DO YOU HEAR?... NUMERO UNO!"

Brrrooother! Was he emotional on the subject of technology supremacy. I covered my embarrassment with a nervous laugh and tried gamesmanship.

"Golly neb, those TIniks are really clever — first the 'chewing gum' magnetic card storage on the SR-52, and now the 'bubble gum' solid-state storage for the '58.'"

His face flushed. I thought he was apoplectic. He raged, "No, you idiot! It's a magnetic bubble configuration which — oh, what's the use? You latter-day scientists are all washed up — you'll never catch up."

He fumed as he stepped on the bus. I didn't see him at all during the convention.

I slithered past the TI booth on the exposition floor and deftly placed one copy of the new announcement in my shopping bag. I immediately caught a taxi to my hotel room, locked the door, closed the curtains, turned up the TV volume and

plopped into my bed to study the specs.

I almost lost my mind! Solid-state master library of 25 basic programs "free" with the machine, with about 5,000 keystrokes of program information, accessible directly as read-only memory or downloadable into primary memory... 480 positions of main memory, partitionable by the user into program storage accessible by character and data registers accessible by word... nine levels of pending calculations in the algebraic hierarchy... 108 keyboard functions performed by 45 keys... scientific, engineering and fixed-decimal notation modes... user-defined labels... short-form addressing... insert/delete instructions with automatic resequencing... six levels of subroutines... 10 control flags... indirect addressing... and on and on.

### Bought Bundle

I bought a bundle of the '58s' for a class I'm teaching. They're a fabulous help for training in programming concepts, and a great bargain for \$119.95 plus tax each, including massive documentation. Unfortunately, they all have to be delivered to my customers.

As for my electronic fossil — the SR-56 — I'll stick with it to protect my investment. I'll just hunker down and tough it out until TI comes out with an alphanumeric capability and a very large wad of bubble (gum?) memory.

I have the stock answer to challenges from my testy colleagues which I have already checked out with my kids when they found out about the "58": "Boys, I have a '56' installed and am currently studying the new announcement before placing a '58' on order."

## Readers Eye Criteria in Sale of DP Lists

The recent questionnaire in this column requesting comments on the disclosure of Social Security numbers (SSN) when government lists are sold [CW, July 11] produced the clarification for which I was looking.

It is not the SSN issue that worries people.

Nor is it the fact that a person providing his SSN for such purposes as obtaining a driver's license is not told at that time that the number may be used on lists that will be sold.

Instead, readers said they were worried about how those lists are used.

And the relationship between the government entity, such as the Massachusetts Registrar of Motor Vehicles, and the person ordered by law to register motor vehicles with him is such that it could be argued that person faces an implied coercion of approval — even when the person

does not know what the actual use will be.

The amount of benefit or harm involved is a third key element. It is insufficient to know that some firm paid the Registrar \$50,000 for the current year's vehicle registration master file.

It is even less acceptable to know nothing beyond the amount of the sale. The use of the \$50,000 also has to be known — and shown pretty specifically — before anyone can give proper permission to retain his name on lists that are sold.

Equally, full information about any possible embarrassment or harm has to be provided, both on an individual and general basis, before any such approval can be provided. It may sound very nice — but if some car salesman is going to use the list to help the other side in a motor vehicle accident case, then self-interest could easily win out over the general good.

Finally, a person who approves the inclusion of his name on lists that are up for sale should be allowed to withdraw his name at any time.

DPers could use these points as

guidelines to help management consider whether a particular sale should take place. These could be phrased in questionnaire form, with a space for answering "yes" or "no."

The questions would be:

- Has individual approval been given?
- Before approval was granted, were the uses to which the funds gained from the sale of the list will be put detailed?
- Was any individual or general harm or embarrassment that might occur explained?
- Have the possible future uses of the information been explained?
- Can approval be withdrawn by the individual whose data is involved?

From these simple questions, the person or board approving any such sale could quickly come to a decision. For instance, a charity specializing in skin diseases might well be prepared to "trade" a mailing list with the research department of a drug company wanting to find some rare combinations of circumstances, even though no apparent financial benefit to the char-

ity, or even knowledge of the sale to those on the list, was apparent.

At the same time, the charity could well refuse to sell the list to some museum shops wanting to sell Christmas gifts at a high profit, even though the shops were prepared to pay and the people on the list had given general approval of "uses that benefit."

In short, by describing the situation of the person involved to those making the sale decision, matters will not happen automatically. And that is the most important thing.

Your comments are asked for on this approach — and, perhaps most important, on how it could be introduced into general DP practices.

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### Correction

In the earlier column on sales of mailing lists, it was erroneously reported the Massachusetts Department of Motor Vehicles had offered its master file of drivers licenses for sale. What was offered, and has since been sold, was the department's motor vehicle file.

The  
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## Random Notes

### 'Marketab' Gets Fortran Rewrite

NORWALK, Conn. — Designed to simplify the processing of questionnaire and survey data as well as the tabulation of existing data files, Marketab from Mnemonics, Inc. has been rewritten in Fortran to be compatible with most computers used today, a spokesman said recently.

The system is currently running on a 65K-byte/32K-word Data General Corp. Nova 3/12.

Object code for Marketab is available for \$20,000; the Fortran source code costs \$22,500. Lease and lease/purchase plans are also available, the company noted from 280 Connecticut Ave., Norwalk, Conn. 06854.

### PCS Enhances Net

VAN NUYS, Calif. — Having installed System 2000 earlier this year [CW, June 27], Proprietary Computer Systems, Inc. (PCS) has now interfaced the data base management system with its own word-processing system on its remote computing network.

The linkage allows users to manipulate large data bases and then produce reports in formats not normally available with conventional DP approaches, a spokesman said from 11125 Saticoy St., Van Nuys, Calif. 91406.

### UCC Gets IMSL Library

DALLAS — The 367 Fortran subroutines of the International Mathematical and Statistical Libraries, Inc. (IMSL) library have been added to the facilities available to users of University Computing Co.'s (UCC) remote computing services.

UCC clients will be provided documentation, newsletters and telephone support from IMSL, UCC said from 1930 Hilene Drive, Dallas, Texas 75205.

## 'To Each His Own'

# Etos Creates Virtual PDP-8

HARTFORD, Conn. — Multiple users of a Digital Equipment Corp. PDP-8 can each have a virtual machine with 32K words of memory running under OS/8 or COS-300 with an enhanced version of the Educomp Time-Shared Operating System (Etos) now available from Educomp Corp.

The update provides the small DEC installation with support similar in concept to what is available to IBM 370 shops un-

der the mainframer's Virtual Machine facility, VM/370. Etos supports batch, real-time and time-shared operations running simultaneously, a spokesman noted.

Although any PDP-8 operating system can be used under Etos, Educomp is stressing its support of OS/8 and COS-300 since they are the most widely used systems in the PDP-8 world. With Etos in place, "the myriad of languages available on a PDP-8" can be run

concurrently.

Requiring a minimum 24K-word Omnibus PDP-8, the system is said to create a resource-sharing environment with immediate access to card readers, line printers, multiple disk drives, flexible disks, magnetic tapes and terminals "of almost any description."

Virtual disk file storage areas are normally allocated dynamically, but can be preallocated to minimize access time within data files and to ensure space will be available even before a long run is executed, he said.

A single board time-share control module (TSC8-75) is required in addition to the Etos software in order to support the virtual machine environment. TSC8-75 is priced at \$2,500 and the Etos software costs an additional \$3,450.

Users must have valid licenses with DEC for the user of OS/8 or COS-300 before Educomp will link either of those operating systems to Etos, the spokesman added.

Educomp Corp. is a subsidiary of Quodata Corp., 196 Trumbull St., Hartford, Conn. 06103.

## Cobol Changes Eased With 'Chain Charts'

CHERRY HILL, N.J. — The Logic Chain software from Applications Programming Co. (APC) is said to be a maintenance/enhancement system that significantly reduces the time required by a programmer to make changes in existing Cobol programs.

Designed for use in IBM 360/370 or Burroughs B3500/B6700 environments, the system provides analyses of both instructional flow and data flow within whatever Cobol source program has been input for study, an APC spokesman claimed.

The logic chain chart produced by the system takes the place of the conventional source program Procedure Division and the procedure cross-reference listings during maintenance and updating. This saves "over 70%" of the time presently spent trying to follow instructional flow, the spokesman added.

Although the logic chain chart looks rather like a conventional program flowchart, APC said it is a different and a better document.

The system runs on an IBM DOS-based configuration with 36K bytes available for the pro-

gram, one disk pack for work files, a card reader and a line printer. IBM OS users require 62K bytes for the program and Burroughs installations should have 36K for a B3500 or 7K words for a B6700.

The package is being distributed on a lease basis for \$7,800 the first year, with recurring charges of \$900/year, including maintenance. APC is at 498 N. Kings Highway, Cherry Hill, N.J. 08034.

## NCR 8200 Gets Precompiler

TULSA, Okla. — Fastbol from Sage Computers, Inc. is an interactive source entry system and precompiler for Cobol programs being developed or modified for the NCR 8200, according to a Sage spokesman.

The software supports faster development work, he said, by allowing the use of certain abbreviations in original coding. As with precompilers for larger systems, Fastbol expands this shorthand into standard Cobol reserved words.

Apparently it does not, however, allow the user to define his own abbreviations and expansions.

A tabbing facility that allows the user to move from field to field on an input line is said to be helpful when editing source statements or data entries. An automatic field sequence generator coupled with an ability to change lines at random within a program is "especially useful" when modifying programs.

The package, said to operate in the 8200's user partition with "plenty of space left over," is available under perpetual license — including one year's support — for \$450.

Sage is at 2323 S. Sheridan, Tulsa, Okla. 74129.

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## Picking a Winner — Part 2

# 'Politics' Must Play Part in DBMS Selection

By Robert B. Chamberlain  
Special to CW

The points touched on in "Technicians Alone Should Not Select DBMS" [CW, Aug. 8] carry with them the implications of "politics" — and the people who discerned that fact are the ones who have a chance at implementing a corporate data base.

"Politics" in this context is not a dirty word; a political problem can only be met with a political solution.

In fact, the politics involved in a successful data base management system (DBMS) selection is likely to differ only in style from that which occurs in a "technician-only" setting. That difference may be seen as the politics of force of personality instead of the politics of organizational clout.

In the technical area, the dispassionate approach known as the "Delphi procedure" seldom seems to win out. A methodical if rather tedious and somewhat redundant means of DBMS selection involving matrices, installation-dependent weightings, etc., the Delphi procedure is a useful tool, but it has two drawbacks in a technical team environment:

- Weightings are meaningless if they refer to the current or converted applications environment instead of the projected data base environment, a likely occurrence in a heavily technical selection orientation.

- The rigorous methodology is likely to be scrapped when a team consists, as it just about always does, of three or four close associates or the same number of strong egos.

The real resolution of the selection, then, is by force of personality, generally reflective of status within the organization. Sometimes, however, sheer strength wins.

This occurs when only one individual survives a marathon meeting called to "choose the damn thing and get on the road." He will stumble out with his face covered with stubble, mumble the lucky vendor's acronym and then, since most of the organization

was not aware of the momentous nature of the meeting, fade into obscurity, along with the technical groups' choice.

An obscurity which, it can be observed, was predictable by the very nature of the team's composition. As to what that composition should be, let's look first at who the team's leader or chairman should be. The prime rule is, if

the chief executive officer doesn't know the name of the selection team chairman, he'll

### Data Basics

never know the results of the team's effort.

In other words, the team must be associated with an in-

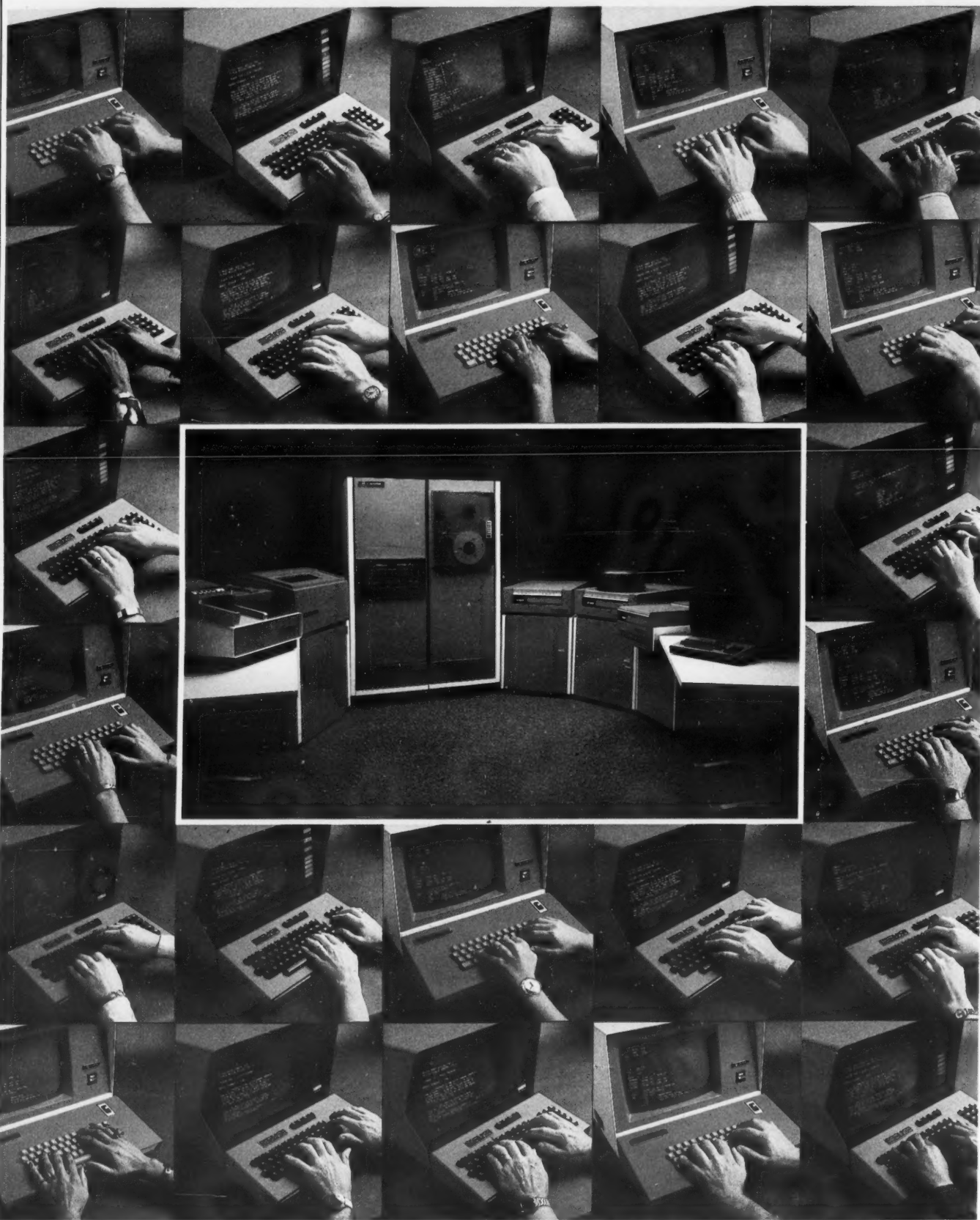
dividual who is strong enough to command attention in the firm and whose leadership indicates that corporate commitment to DBMS is firm.

Other team members would include a chief analyst (preferably one with both a sturdy disregard for the status quo and the ability to quantify new requirements), a chief technician; a user representa-

tive appointed by the chairman; and a person from the operations section who can provide direction on such useful ordinary subjects as forms usage, current report distribution, etc.

All team members should be senior enough to call on personnel within their own areas as various aspects of the prep-

(Continued on Page 21)



#### NOTICE OF REQUEST FOR PRICE

The State of Indiana, Department of Administration, Data Processing Division, is accepting sealed proposals on a financial-leasing agreement on an IBM 370/168-M33 Computer System, part of which is currently installed and the rest on order from IBM due for installation in August, 1977.

The proposal includes purchase from the State of an installed IBM 3165-II Model K Computer System.

Proposals must be received in room 507 at the State Office Building Indianapolis, Indiana, by 10:00 A.M., Legal Time, August 18, 1977.

For additional information contact Charles E. Woodard (317) 633-4690.



# Module of Month Plan Has Language Option

SADDLE BROOK, N.J. — Users in a range of environments may find low-cost solutions to a variety of DP problems through the Module of the Month (M/M) Division of National Data Systems, Inc.

Under the M/M plan, modules are available in a choice of ANS Cobol, RPG-II or IBM Assembly language for as little as \$14.95 for a source listing or \$19.95 for a listing and a machine-readable card deck,

according to a spokeswoman.

The highest priced module now is \$24.95 or \$34.95, she noted. All orders must be pre-paid to allow the division to continue these prices, she emphasized.

The division publishes a newsletter describing its software. Despite that and its "clubby" sounding name, however, the plan does not involve memberships, minimum purchases per year or

automatic mailings unless the user notifies the division otherwise, she added.

The most recent routine available through M/M is Csort, which manages in-memory sorts with "any combination" of ascending or descending keys. Based on a bubble-sort algorithm, it is said to require much less memory than the internal sort that invokes "the usual sort utility."

For a limited time, Csort is available under M/M's \$14.95/\$19.95 pricing, the spokeswoman said.

Other modules include a Julian/Gregorian date conversion and perpetual calendar subroutine; a Modulus-10 check digit subroutine; and Tallyall, a utility for column-by-column analysis of data.

The data conversion routine works "in either direction" and includes a determination

— and printing — of the day of the week of the date, if desired.

Tallyall is the most substantial of the routines now available and it carries the \$24.95/\$35.95 price. In all cases, the card decks can be furnished in either 80- or 96- column format.

Requests for the M/M newsletter and orders for the modules should be addressed to Module of the Month, National Data Systems, Inc., 299 Market St., Saddle Brook, N.J. 07662.

## 'Politics' Part Of DBMS

(Continued from Page 20)

ation for the actual selection take place. No weighting of each team member's influence should be construed; each plays his own role in the process.

The chairman, in concert with the others, makes the final decisions and they become corporate decisions.

A team of this type has a much greater likelihood of effecting a successful transition to data base because it contains the key ingredients of organizational support and careful planning. It should be incumbent upon all would-be data base shops to carefully consider the options discussed and learn how they can affect successful implementation.

Chamberlain is senior consultant, information systems, with CACI, Inc. — Commercial in New York. He is now on temporary assignment in Europe.

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## Cites Limitations

# SNA Survival Short, Expert Predicts

By Ronald A. Frank  
CW Staff

DALLAS — IBM's Systems Network Architecture (SNA) cannot survive as a viable architecture beyond the next few years, according to Howard Frank, president of Network Analysis Corp.

Speaking at a recent meeting of the Com-

puter & Communications Industry Association here, Frank described to industry executives the limitations that exist in the structure of SNA.

Even though IBM touts SNA as the architecture of the 1980s, this is "virtually impossible" because of its current inflexibility, Frank said. Unless SNA capabilities are

upgraded, SNA will be "the most archaic architecture around" when users want to be able to freely attach minicomputers, maxicomputers and terminals to their networks.

One of SNA's biggest limitations is that arbitrary point-to-point communications within a network cannot be accomplished easily, Frank said. He attributed this to the primary/secondary status required for stations in an SNA configuration.

"Stations must have either primary or secondary status. These stations are usually not software-programmable, but are preprogrammed at the time the network is put in place," he noted.

This means the user often cannot go from point A to point B because point A may not be in the hierarchy chain, he explained.

SNA configurations generally require a terminal to communicate with its own host CPU before a line can be established to a terminal attached to another host. The capability that permits a terminal to go directly from its own domain to a second domain has been described in IBM's Advanced Communications Function (ACF), but it is believed the company has not yet demonstrated this is a network, Frank said.

According to Frank, other limitations existing in SNA are:

- The host software gets more complex as the network gets larger.
- The local loop required for certain SNA terminals is cumbersome because if a single terminal goes down the entire loop goes out unless the user builds in alternate paths.
- Timing issues in the SNA loop requiring everything to be "sensitively tuned."
- The loop configuration has throughput problems because its capacity is much higher than if the net were constructed with a "tree-type concept."

(Continued on Page 25)

## User Optimizes Phone Network With Computerized Switching

DALLAS — Southland Corp. is beginning to solve many of its telecommunications problems with the help of a computer-based switching system for managing long-distance telephone communications.

The Datapoint Corp. Infoswitch system installed last March already has presented Southland with a \$20,000/mo reduction in long-distance telephone costs, reduced waiting times for outgoing calls and helped cut the average call length, according to Jerry Edwards, Southland's manager of communications.

The system also is providing the company with the kind of detailed traffic information it needs to improve its expanding communications network, Edwards said.

In addition to being a large operator and franchiser of self-service convenience stores in this and three other countries, Southland owns and operates a chain of specialty food shops, three food-processing centers, 12 regional dairies and a truck leasing firm.

Until a few years ago, the conventional telecommunications facilities employed at Southland were adequate. However, an expanding volume of traffic between the company's divisional and regional offices and its corporate headquarters here, combined with higher line tariffs and steadily increasing long-distance costs, soon outmoded those facilities.

When Edwards joined Southland a little over a year ago, he was faced with a challenging situation. "The telecommunications program at Southland was not very well defined and we were without the kinds of communications information it would take to design and implement an effective corporate program," Edwards recalled.

"Our only telephone facility, a 701 Centrex, provided us with nothing in the way of

accumulated line-usage statistics or comprehensive traffic analyses. Since the configuration of our previous switchboard facilities would not allow us to process and route incoming calls, approximately \$35,000 a month was spent on operator-assisted calls coming into the Dallas area," he continued.

"Also, a traffic study conducted by the telephone company shortly after I came to Southland indicated utilization of the company's seven national outbound Wats lines was only about 60%, with queuing times ranging anywhere from one and a half to two hours," he said.

"Obviously, we had to find a way to reduce the cost and maximize the effectiveness of our long-distance telephone facilities. But we were also looking for a call management system that would provide us with line-usage data and call detail with which we could design a more effective nationwide communications network," he said.

After an extensive study of Infoswitch and two other telecommunications management systems, Southland decided the Datapoint system could best meet its long-distance telephone switching and management needs,

(Continued on Page 24)

## Source Book Covers IBM

CULVER CITY, Calif. — Users who need to keep track of IBM communications hardware, software, protocols and other teleprocessing topics can get help from a handbook published by Contemporary Communications, Inc.

Called *The IBM Teleprocessing Source Book*, the 144-page publication includes references to IBM technical manuals,

trade journal articles and other references related to IBM communications products.

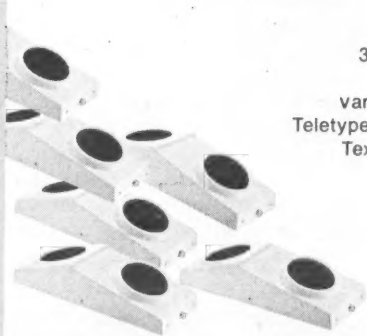
The publication covers operating systems and access methods and lists IBM terminal systems as well as other equipment. It costs \$45 from Contemporary Communications, Box 3075, Culver City, Calif. 90230.

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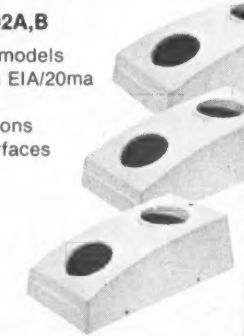


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# Switch Helps User Reduce Telephone Costs

(Continued from Page 23)

Edwards said.

The Infoswitch system installed at headquarters includes a Datapoint CPU (which Datapoint won't identify) with 48K user memory, a 5M-byte disk for program and accounting data storage and an 80 char./sec Datapoint Freedom printer for permanent copy report generation.

It also has an intelligent real-time controller that manages all the details of call placement and a reed relay matrix for telephone line switching and all other necessary line interfaces.

The main processor console is equipped with a typewriter-style keyboard plus an 11-key numeric pad, five control keys and a 960-character CRT display.

"The system installation was extremely smooth. The equipment was installed on Friday, tested over the weekend and in full operation by Monday morning," Edwards said.

"In the beginning we were bothered by a few minor problems — static electricity problems and telephone company interfaces that needed adjusting — but these were pinpointed and corrected almost immediately by Datapoint's customer service personnel," he recalled.

The elimination of unauthorized calls, increased availability of outgoing long-distance lines, effective routing of calls over least cost facilities, a reduction in the number of switchboard attendants and more detailed call-accounting information have added up

to substantial savings, according to Edwards.

"Before we acquired the Infoswitch, nearly 29,000 outgoing long-distance calls — which equaled about 130,000 minutes of calling time — were being processed a month. Each of these individual calls lasted about 6.9 minutes and the average queuing time for a call was about an hour and a half," he said.

"A great deal of money was wasted on Wats lines that were either inaccessible or only partially utilized. Now that Infoswitch has provided us with an extended and flexible route selection of economical line facilities, we have cut our costs by more than half," he claimed.

"With this kind of savings in time and money, we have been able to

eliminate two outgoing national Wats lines and four intrastate Wats lines and reduce our switchboard operating staff from three to one."

Because the management system maintains a detailed accounting record of each outbound long-distance call — including the date, time of day, caller identity code, destination telephone number and call duration — unauthorized calls have been discouraged or eliminated.

Infoswitch also has reduced the queuing time for a call to under 30 seconds; maintained a constant flow of traffic over all outbound Wats lines, and helped reduce average call length from 6.9 minutes to 4.1 minutes, according to Edwards.

## Call Control Routing

Southland is also using the system to control and route Wats line calls coming into the Dallas area from locations throughout the rest of the country.

In Southland's system configuration, all 10 of its national inbound Wats lines terminate on the input side of the Infoswitch. To prevent call blockage or excessive queuing times, these Wats lines are matched with 10 tie lines running from the management system to the Centrex facility.

"Previously," Edwards noted, "all inbound long-distance calls were operator-assisted (third-party billing, credit card and collect calls) and the cost was approximately \$35,000 a month. Now, with the use of the Infoswitch, we are processing the same number of calls and perhaps more for about \$15,000 a month."

The system is also equipped with a set of maintenance diagnostics in microprogrammed memory. If any component fails a diagnostic test, the exact position of the failing board is indicated on the control panel for immediate location and replacement by the communications manager or service technician.

"When it came to choosing the Infoswitch system, the maintenance factor was a big plus, Edwards noted.

"The system virtually does all the maintenance for me. Not only that, I can replace a failing circuit interface board without shutting the system down.

"The system requires only one type of circuit interface board, whereas the other systems required a different type board for each type of line facility utilized."

The Infoswitch system has profited Southland in a number of ways, Edwards concluded. "The detailed accounting and line-usage data provided by the system has enabled us to accurately assess existing and future communication requirements. Most important of all, the ability to communicate quickly and efficiently is enabling Southland to maintain an aggressive posture in an extremely competitive business world," he said.

## Azurdata Adds Service Plan

RICHLAND, Wash. — Users of portable order entry terminals from Azurdata, Inc. can now select a Full-Service Program that ensures timely maintenance and provides management reports to monitor both terminal performance and service costs, the company said.

Azurdata is located at 1100 Jadwin Ave., Richland, Wash. 99352.

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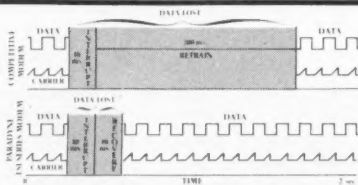
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## Multiterminal Packet Net Being Built in Netherlands

LRIJSWIJK, The Netherlands — A minicomputer-based packet-switching network is being built for the Rijkswaterstaat (water control department) of the Dutch Ministry of Transport and Public Works.

Called the Communications Network (CNET), the system is described as the first packet-switching network in Holland. In mid-1978, it will service existing local and remote terminals, of several differing types, by allowing them to communicate with Rijkswaterstaat's central computers located here.

In 1979-80, CNET will provide communications between several Dutch ministries' networks of the Dutch Postal Telephone and Telegraph Authority. This will enable sharing of the existing large computer facilities.

At that time, CNET will act as the primary data transport for a number of monitoring and control projects currently being planned or in development on a national scale. These include projects to collect and process data on river water quality and flow rates and to measure the characteristics of Dutch coastal waters, according to a project consultant.

A major advantage of CNET is that it will take care of all necessary communication protocol conversions.

The network design will be based on the principles adopted in the switching nodes of the European Informatics Network (EIN). EIN is an international packet-switching network designed and implemented in 1974-75.

New concepts will be incorporated in CNET, including the use of the CCITT recommended X.25 protocol

incorporating a virtual call service.

CNET hardware includes a Univac 1100/40 and two Philips P1400 mainframes. Minicomputers will be Digital Equipment Corp. PDP-11/34s with 48K words of core memory and communications interfaces.

Of the five PDP-11/34s, three will function as host interface processors for the mainframes while the remaining two will operate as switching nodes for terminals in the network and will connect to two of the three host interface processors.

Connection between the minicomputers will be over 4,800 bit/sec lines with the majority of terminals operating on private lines.



## SNA Limitations Cited by Expert

(Continued from Page 23)

The SNA structure sets up "enormous complexity in the host," Frank said, referring to the fact that teleprocessing software modules are shared between the CPU and the 370X front end. The number of software modules of the Vtam access method that reside at either processor depends on the specific network configuration, he said.

There is no one that understands the cost/performance trade-offs of an SNA net and "no one really understands the economics involved," he said.

Frank also outlined the dependence of a 370X on a specific mainframe and said this is a liability when the CPU is not operating. Other networks such as the Arpa net have shown that it is possible to build front ends that can operate with multiple CPUs, he noted.

"I don't know of very many people that have SNA working," he said. "I've been told there are 85 SNA installations, but these are all in the development stage rather than in the operational stage."

IBM reportedly has tried to overcome the terminal-host dependence by allowing an operator to establish an alternate path to a second CPU. But this is not a viable solution for unattended sites or networks with hundreds of terminals, Frank said.

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## Data Entry Conference Set for October

NEW YORK — The First Annual International Data Entry and Distributed Data Entry Conference will be held Oct. 17-19 at the Waldorf Astoria here. The conference will be sponsored jointly by the American Management Associations (AMA) and the Data Entry Management Association (Dema).

The AMA/Dema conference will concentrate on the human side of data entry and distributed data entry, according to a spokesman. There will be seminars conducted by authorities with the latest information in the field; panel discussions to present different viewpoints about common problems; and workshops to enable conference members to exchange ideas and experience, he

said.

Some of the topics scheduled for the three days include "Motivation and Communications," "Data Capture," "Performance Measurement and Quality Assurance," "Implementing a Data Conversion" and "Managing and Controlling a Distributed Data Entry Environment."

Dema members attending the conference will have an opportunity to participate in that organization's first annual business meeting, the spokesman noted.

Additional information and registration details can be obtained from Marilyn Bodek at Dema, 16E Weavers Hill, Greenwich, Conn. 06830.

## Clean Design Ends 'Powerful' Problems

By Warren Lewis  
Special to CW

There are a great many DP professionals around who know about the requirements for clean, stable power in a computer room.

There are also a lot of electrical contractors and consultants around who are very good at designing electrical power structures for buildings and industrial plants.

Unfortunately, the electrical people and the DP people do not communicate well when it comes to designing the power structure of a computer facility.

I have spent many years with the facilities planning staffs of several major computer manufacturers, and I can attest to the fact that, more often than not, the power struc-

ture of the computer room is inadequate as originally designed. The result of this poor design is that the computer starts having intermittent problems — often referred to as "mysterious computer failures."

Typical failures occur when the computer mysteriously halts, the computer goes to wrong addresses, garbage comes out of the computer and when programs will run some days and not others. When the installation problems are more serious, safety can be involved or rotating equipment such as disk drives can be damaged.

IBM states in one of its customer engineering manuals that about 40% of the input power receptacles in customer locations are

initially phased improperly. This can cause equipment damage — or such fun things as disk drives rotating backward.

Sometimes a problem as basic as inadequate power occurs. At other times, the environmental controls interact with the computer controls. At times like this, it is not unlikely for the computer to do something funny every time the air conditioner cycles.

Most electrical contractors will tie the computer room into the standard building wiring. This almost assures the power into the computer room will not be clean.

The problem is usually caused by multiple tie-ins to the building ground structure. Transients on the normal building wiring are sure to get to the computer. Most electrical designers have a gross misunderstanding of what a computer grounding structure should look like.

Normal grounding structures are designed for electrical safety and cost. This usually

(Continued on Page 29)

## CMC Changes Leasing Policy

LOS ANGELES — A number of pricing policy changes in the lease structure of its Keyprocessing systems has been reported by the CMC Division of Pertec Computer Corp.

For CMC 3, 5 and 6 Keyprocessing system customers who execute or extend a lease to a term of 24 months or longer, CMC is offering software features for multiple formats, reformatting, tape entry and data validation at no charge, according to a spokesman.

For its CMC 7, 9, 12 and 36 customers, CMC is offering lease rate discounts of 5%, 10% and 15% in lease renewals for an additional one, two and three years respectively.

An overall 2% increase in Keyprocessing lease rates on new leases, renewals and extensions became effective July 1, the spokesman added.

CMC is located at 12910 Culver Blvd., Los Angeles, Calif. 90066.

## Art Depicting Early DP Offered

SANTA ANA, Calif. — People in DP centers who are tired of seeing swirls and sworls from plotters and graphic output from printers adorning the walls as "decor art" may be interested in an offering from the *Data Entry Digest*.

Ronald G. Henderson, editor of the publication, has a limited original collection of drawings that depict turn-of-the-century DP activities. The drawings were made from original photographs and publications found in archives in different parts of the country, he said.

The five drawings in the set depict the use of the original keypunch and card sorter, as well as persons using early telephones and dictating machines. The series includes a sketch of the "boss" sitting behind his roltop disk, Henderson said.

The drawings will be furnished in two sizes, one poster size and one framing size. Each set will be numbered and signed by the artist.

A set of both size drawings costs \$39 from the *Digest* at 10522 Ridgeway Drive, Santa Ana, Calif. 92705.

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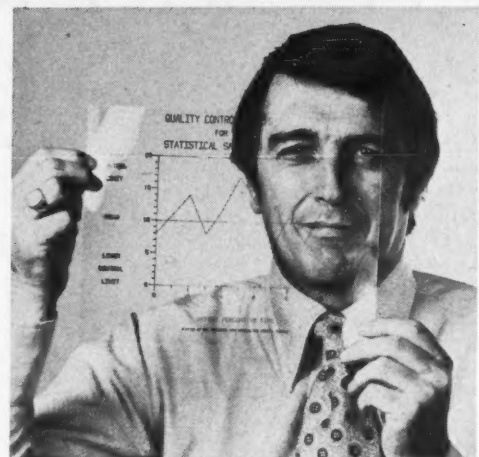
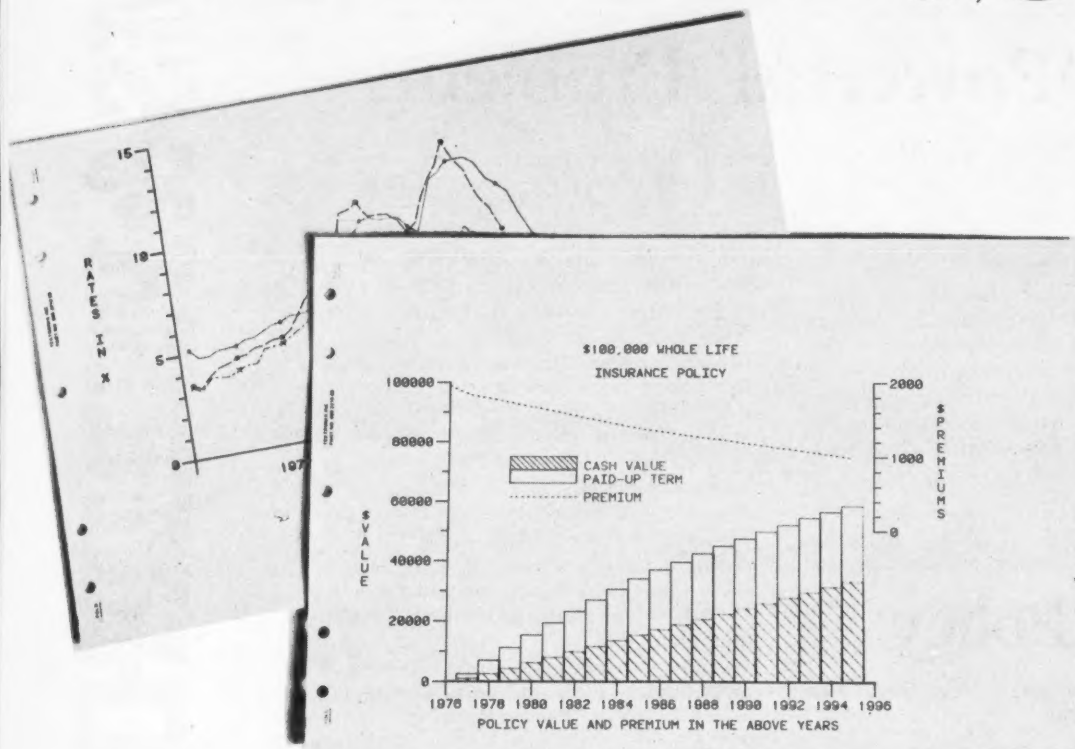


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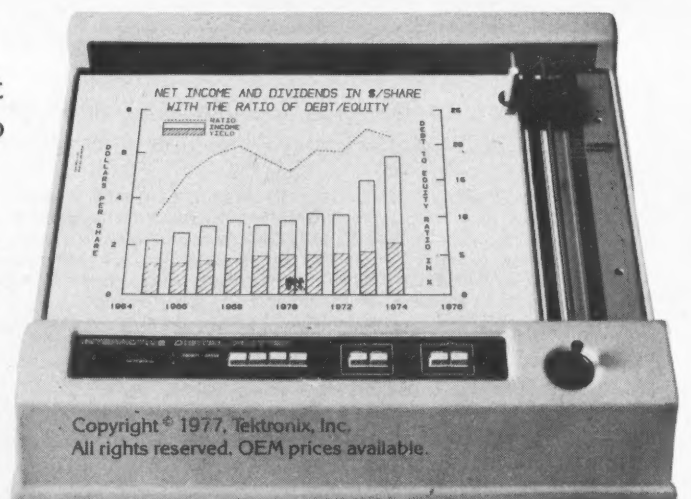
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# Bad Power Design Causes CPU Problems

(Continued from Page 27)  
results in a minimum-code design.

This minimum-code structure is often subject to ground loops and other horrors faced every day by computer service people. What is needed is a single-point ground structure that not only meets the safety codes, but also the performance requirements of each computer manufacturer.

## The Security Factor

Elaborate precautions are usually taken to protect the integrity of computer facilities. Unfortunately, the power to the facility is generally left out in the open, where anyone can get at it.

It is not surprising to find an isolation transformer in the janitor's closet or even out in the parking lot. If the transformer is tampered with, the whole computer facility goes out.

Why is this security gap allowed? Simply because very few even know that the gap exists.

Another farce is often documentation. After the power structure is installed and the electricians leave, there is rarely anyone who can trace problems in the wiring. If any documentation is provided, it is generally inadequate.

In addition, the wiring is often poorly labeled and difficult to trace. It can — literally — leave the DP manager in the dark.

This is poor human engineering. Even the electrician who originally installed the room usually can't come back six months later and easily trace a problem.

## Build and Hope

The best an electrical contractor can do is design an electrical structure for a computer room, build it to code and hope it works.

But there is a better way. The alternative is to gather all of the electrical power apparatus in one place inside the computer room, put it in a cabinet and lock it up tight. The com-

puter room people then have total control over the power structure. Nobody else can get to it, modify it to defeat its purpose or damage it.

The answer, then is to put the computer power in the hands of the computer professionals. Nobody else is sensitive to the unique problems that exist in a computer room. An electrical person will argue that the computer is "just another load" on the electrical

system. It's not; it's much more critical.

In 1967, at Xerox Corp. we melded our knowledge of the computer room's unique requirements with our knowledge of electrical power and designed the first power center. A power center is programmed to provide the proper voltages and currents to all of the equipment in the computer room.

In addition, it isolates the

computer equipment from spurious signals in the building wiring that can keep the computer from working properly. It can even turn off the computer equipment in case of a safety hazard in the building.

The first prototypes were tried at Xerox in 1969. During 1971 and on through 1973, a significant number of Xerox computers were switched over to power centers.

Companies now provide power centers that can be used with any brand of computer equipment. At such companies we think of ourselves as partners with, rather than replacements for, the electrical consultants and contractors who are so necessary for overall facility design.

Lewis is vice-president of engineering with Computer Power Systems Corp. of Long Beach, Calif.

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## Printer Configures System To Produce Complete Pages

By Frank Vaughan  
CW Staff

DALLAS — A yearbook publisher here is using a medium-scale mainframe as the heart of a multivendor system that creates page positives complete with text, photo areas and art rules.

Taylor Publishing Co. officials refer to the system as "Pagination" because it sets and positions type, blocks out space for pictures and numbers each page. There's no need for the traditional cutting, pasting or positioning by hand, a spokesman noted.

Taylor has used the system since 1972 to turn out full pages of type and picture layouts for 1.2 million original

pages each year.

"This system has given us a tremendous edge over our competition," according to Randolph B. Marston, Taylor's president.

Marston estimated the Pagination system contains about \$5 million worth of hardware and software.

"We found there wasn't a system on the market that could do everything we wanted in copy preparation and typesetting. We had to create it ourselves," Marston recalled.

"We put our ingenuity to work and purchased the most advanced equipment available at the time, then we designed the software and hardware to utilize it to the fullest advantage," he said.

The system is built around an IBM 370/145 configured with 256K bytes of IBM memory and 256K bytes of add-on memory from Cambridge Memories, Inc. The CPU processes text and page layout data, performs hyphenation and justification and computes the proper location of all elements on a page, the spokesman said.

The mainframe is equipped with seven Telex Corp. 6316 disk drives, four California Computer Products, Inc. Model 235-11 double-density disk drives, five Telex 6420 Model 7 tape drives, two Telex 5403 printers and two IBM 2540 card readers.

Tape generated by the 370/145 is used to drive a Harris Corp. Fototronic CRT typesetter that turns out pages ready for film stripping and plate making.

Digitizing, which is common in engineering and scientific applications but is unheard of in publishing circles, is part of the pagination process, according to the spokesman.

Taylor's digitizing system is based on a Texas Instruments, Inc. 980B minicomputer configured with 65K bytes of memory. Complementing the mini are 12 Summagraphics Corp. digitizing boards, 12 Tektronix, Inc. 613-1 graphics display terminals, one DS-330 disk drive from TI and a Printronix, Inc. line printer.

The system enables an operator to copy the layout of a yearbook page and transfer it to permanent disk storage in about 45 seconds. A layout is made when the text is put in place, pictures are scaled for size and positioned and horizontal and vertical rule markings are inserted.

Each operator is able to check the accuracy of the layout on a display terminal, the spokesman noted.

While the layouts are being prepared by the digitizer, text input is accomplished through a Recognition Equipment, Inc. Input-80 optical character reader. Copy prepared on an IBM Selectric typewriter is read by the scanner at a rate of 12 page/min. and transferred to magnetic tape. The type size and style is specified at the same time.

The tapes from the digitizing system and the optical character recognition operation are eventually processed by the 370/145 and the information is merged on a single tape for use on the Fototronic typesetter.

In 10 seconds, the spokesman said, the Harris device produces a full page positive containing the text, picture areas and art rules.



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## Believer in Multiple CPUs Says

# Two Minis 'Express' Data to Truckers

By Esther Surden  
CW Staff

CARLISLE, Pa. — "I believe in multiple small systems because when the big one's down, everything is down," Dick Guyton, DP manager for Daily Express, Inc. said in explaining how his firm has evolved into a user of two on-line minicomputers and one batch-oriented small business system.

The company is a specialized truck carrier that hauls truckloads of farm gear, heavy machinery and construction equipment.

The batch system, an NCR 101, is used to perform accounts receivable and payable, contractor settlements to pay contractors who deliver the loads, a self-insurance program and fuel tax reporting as well as to keep track of any areas with which regulated companies have to comply.

The two on-line Microdata Corp. Reality systems perform a motor truck dispatch application and also do the billing, accounts receivable and payable and check-clearing activities for two other divisions of the company.

Daily Express had been computerized with the NCR equipment since 1970, but decided it needed to go on-line to keep track of its motor dispatch application, Guyton said. Prior to the installation of the systems, dispatching had been done manually.

"We were handling the application with little pieces of paper stuck in slots in the wall," he recalled. "We had a plastic card that represented a trailer, and we had a 4 by 6 card that represented a power unit. Then, when we wrote up the work order, we would match the appropriate tractor with the appropriate trailer and put the load card with it."

"Then when you made an entry on the loadcard, you had to look for it, write the entry on it and then pass it over to the entry department. So a lot of time was spent searching" for the card, he said.

### On-Line Dispatching

Because communications costs were rising when it couldn't find the information needed to respond to phone calls and because it was having difficulty keeping track of its equipment, Daily Express turned to an on-line dispatch system.

An extensive search that took about two and a half years narrowed the field of available systems down to the Microdata Reality, Hewlett-Packard 2000, Interdata 8/32 and the Digital Equipment Corp. PDP-11. The Reality was chosen because of its operating system, Guyton said.

The first system was purchased from Keystone Data Systems, Inc., the Philadelphia-area Microdata dealer. A second system was bought later.

One of the on-line systems has 64K of memory and includes 25M bytes of disk

storage, a magnetic tape system and 24 communications ports. The other, also a 64K system, has only 20M bytes of disk, tape, 18 communications ports and a printer.

The firm has about 28 CRTs in-house. Outlying sites communicate with the system via 13 Decwriter teleprinters, several Teletype machines and CRTs.

### Programs Written In-House

Programs were all written in-house in Basic, Guyton noted, because there were no packages available for "what we wanted to do." The Microdata English language is used for ad hoc report generation, he added.

Users of the dispatch application access an integrated data base which includes a load file, tractor file and trailer file. When the sales department receives an order, it keys the information into the system through its CRTs.

The data entered includes load information and a complete description of the job. "We don't have a hard-copy load card, in effect," Guyton pointed out.

The information is then made available to the dispatchers. Scanning CRTs at their locations, they determine what resources are available, what loads they have to move and when they have to move them and then assign equipment.

The act of assigning equipment simultaneously updates the tractor file, trailer file and load file, Guyton said.

When a trucker calls in after the truck has been loaded, the dispatchers input the actual weight and delivery date as well as any other information he might need to complete the delivery or the firm might need to produce a bill.

When the trucker empties the load, he calls a dispatcher, probably located in a remote location. The dispatcher keys in the driver's unit number and enters any final billing information needed.

The system also produces management re-

(Continued on Page 33)

## Mini Bits

### Iota Has Alarm Feature To Alert System 32 Users

PROVO, Utah — Iota Computer Services, Inc. has a device that reportedly alerts IBM System 32 operators when the system needs human attention.

Called the Hawkeye Sentry, the device is said to notify an operator when a system detected blinking error occurs or when the operator is in an interactive data entry mode and hasn't entered data for a significant amount of time.

The audible notification is repeated every 15 seconds until it is acknowledged by the operator.

The alarm can be disabled by pressing a stop button on the system control panel if the system is validly idle.

The Hawkeye Sentry is user-installable and costs \$285. It will be available in the fourth quarter from Iota, which can be reached at P.O. Box 1321, Provo, Utah, 84691.

### Seminar Set on Warehousing

CHESTNUT HILL, Mass. — A seminar on minicomputer systems for warehousing/distribution operations will be given Sept. 14-16 at the Management Institute of Boston College's School of Management here.

The seminar will attempt to tell managers "how real-time interactive information can be used to improve productivity in receiving, distribution, back-order handling, inventory control, stock order locator systems and scheduling, among other applications," a spokesman said.

Leading the seminar will be Stephen A. Levine, president of The EDP Corp.

The sessions cost \$425. Additional information is available from the Seminar Administrator, Management Institute, Boston College, Chestnut Hill, Mass. 02167.

### Lockheed Systems Get Disk

PLAINFIELD, N.J. — Lockheed Electronics Co., Inc. has enhanced its small business system III with the addition of a floppy disk.

The subsystem is said to be compatible with the IBM diskette and may be read or written by the IBM 3740 or 3600 subsystems.

The unit features a transfer rate of 250 bit/sec and an access time of 11 msec per track. It costs \$3,675 from Lockheed in Plainfield, N.J. 07061.

## Report Urges T/S Over Mini

WELLESLEY, Mass. — "Investing in your own computer — even a minicomputer — isn't always the answer to your data processing needs" is the warning issued by "Points to Consider Before Selecting a Computer," a free booklet available from Keydata Corp.

The firm, a commercial time-sharing service that also provides on-line business DP services to wholesalers, distributors and manufacturers, noted that "realistic estimates of the cost of installing a modest-size minicomputer range between \$60,000 and \$70,000, plus monthly charges."

Calling the purchase of an in-house system "a sizable risk many small companies don't want to take because computer failures can literally put small companies out of business," the firm urged users to consider on-line time-sharing.

Software is the unpredictable element in minicomputers, the report said. "When something goes wrong with a program after it is written or the software needs some other modification, only trained programmers can make the necessary changes," Keydata cautioned.

Producing applications software is a complicated matter, the report continued. "Minicomputers, because of their size and capability, actually require more complex programs than many large computers, and the development and debugging of this software is basically an operation performed

by highly skilled programmer/technicians whose wage rates are continually rising," it said.

In the majority of cases, a minicomputer requires an operator. Since most businesses are dynamic, they require alterations in both hardware and software, necessitating the hiring of an outside software firm or the development of in-house technical expertise.

"Either option has its difficulties," the report said. "Many software firms make their profits from marketing computers rather than software. Thus their primary focus tends to be on developing software packages for new accounts, rather than maintaining software already installed."

"These firms have a high mortality rate, so there is no real assurance the one you select will be available continuously to handle your software requirements," the report added.

"On the other hand, finding and managing a good technical staff also presents problems because good people are in short supply because of the rapid growth of the industry."

The report offers a checklist of costs that are most likely to occur with the installation of an in-house system and covers some hidden costs, such as the cost of supplies, security, air conditioning, personnel support, parallel-operation equipment, documentation and hardware insurance.

The report is available from Keydata at 20 William St., Wellesley, Mass. 02181.

MINI-TWO-REPORT



# Adding OCR to Mini Speeds Remittance Task

EUGENE, Ore. — Optical character recognition (OCR) equipment hooked to a minicomputer has helped Liberty Communications here solve a complex remittance-processing problem.

The firm, a cable television company, previously gathered customer payments at 32 field service offices. The payments were then forwarded to a service bureau for processing, according to Carolyn Chambers, vice-president and treasurer of the company.

When a customer called in with a question concerning his bill, Liberty could not provide a quick answer because of the way the remittance processing was being performed, Chambers recalled. Sometimes it would take 15 days to bring the records up to date, she added.

A consultant, William T. Geoghegan, was hired to help find a solution to the problem and give the firm better control of its accounts.

After looking at various solutions, such as the possibility of having the customers send back coupons, both the consultant and Chambers agreed OCR would be the best solution.

Most OCR systems were too expensive or too complex to be cost-justified for use with the firm's minicomputer, Chambers noted.

From an advertisement and from an exhibit at the National Computer Conference, the company became aware of the Datareader from Key Tronic Corp. of Spokane, Wash. The firm purchased the system because of its low cost and the location of the vendor's manufacturing plant, Chambers said.

Liberty has over 100,000 customers geographically dispersed across the country who are billed on a bimonthly basis. The Datareader handles the entire remittance-processing routine.

## Processing Routine

The application requires the scanning of a remittance payment stub printed in the OCR A font and the associated check. Two fields, the account number and amount field, are scanned on the remittance stub. This information is printed twice on the same scan

band to ensure reading accuracy.

Upon receipt of the remittance document and check, the operator verifies that the amount due and the check amount match. Those that don't — about 2% — are set aside for manual key entry.

The operator then drops the remittance document into the top drop feeder and the check into the bottom of the dual-drop feed unit for scanning

and processing by the Datareader.

If an error occurs, the Datareader automatically stops the processing operation, sounds an audible alarm, clears the data from its output buffer and does not transmit any of the data from that document to the CPU.

The operator will run the same document through an additional two times to make sure it cannot be read. If the

document is still rejected, it is set aside to be manually entered.

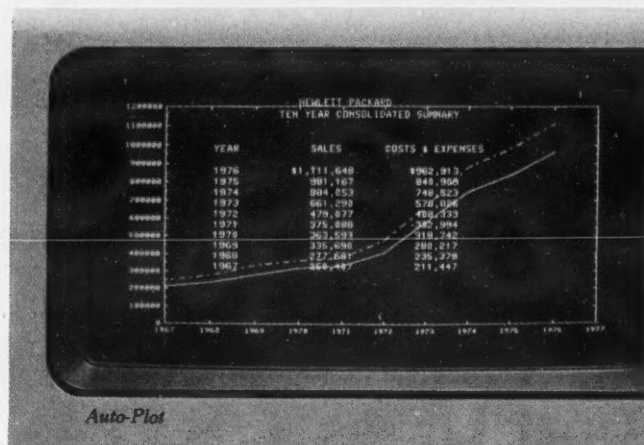
Eighty percent of all documents are read on the first pass and 40% to 50% of the remaining documents are read on the second pass, giving the system a successful read rate of 90% to 95%, Chambers said.

Key Tronics standard check-processing routines are available for processing checks in this application. Chambers ex-

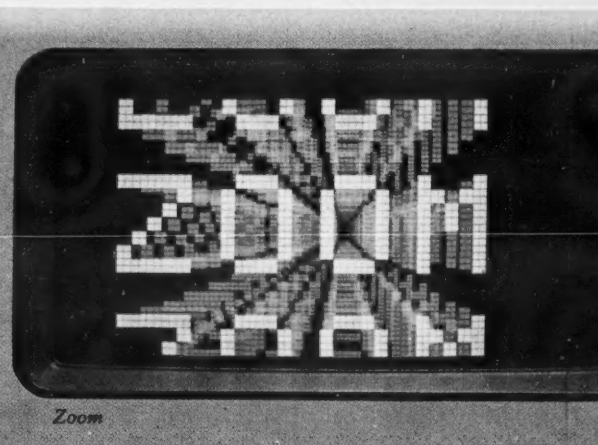
pects to process between 2,000 and 2,500 sets of documents per day at a 90% read rate with the single OCR unit. Liberty has purchased a second unit to accommodate its annual growth.

Liberty is using a Hewlett-Packard Co. 3000 series II computer as its processor. The Datareader with RS-232 interface is directly on-line to the asynchronous RS-232 I/O port on the HP 3000.

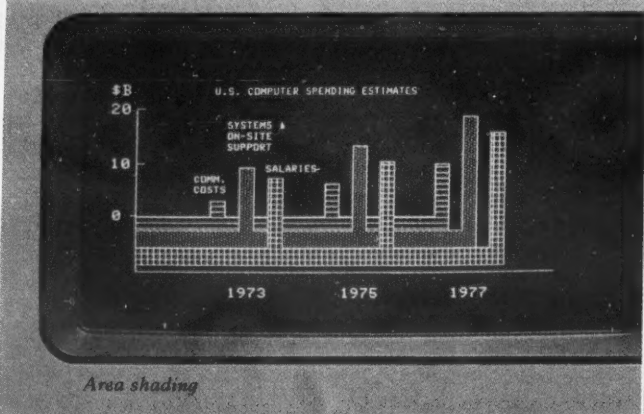
## Hewlett-Packard brings a bright new look to low-cost graphics.



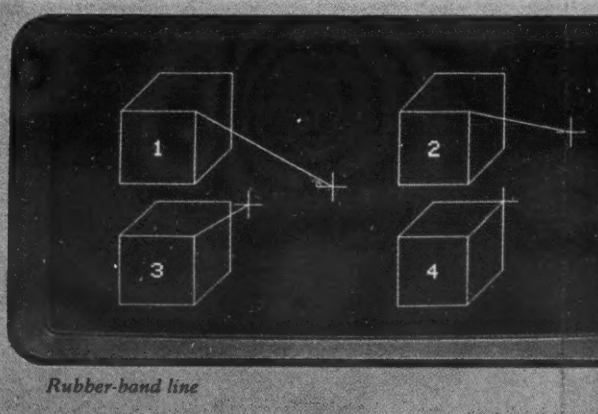
Auto-Plot



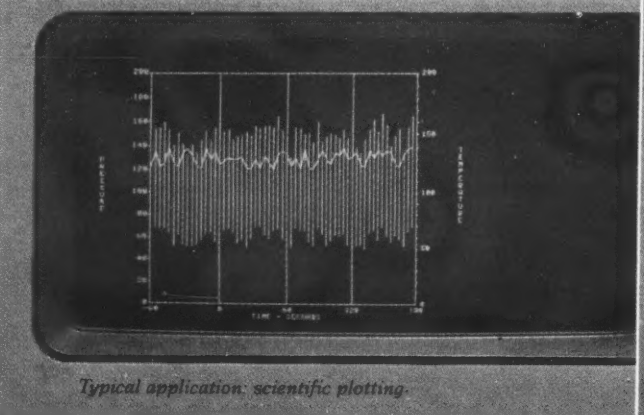
Zoom



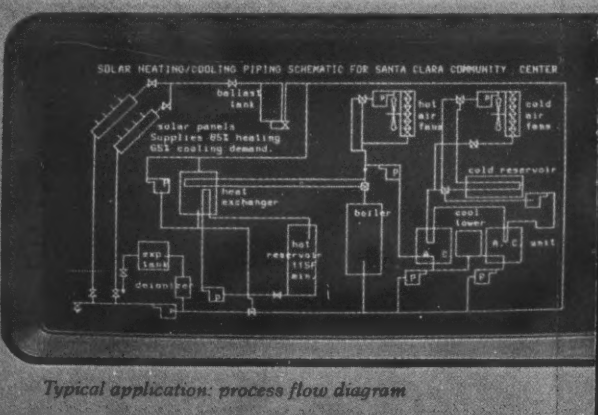
Area shading



Rubber-band line



Typical application: scientific plotting



Typical application: process flow diagram



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## STC Turnkey Enhanced

PARAMUS, N.J.—Storage Technology Corp. (STC) has enhanced its turnkey minicomputer-based business system with the addition of an English-like language that "allows a nonprogrammer to completely specify the requirements for new report programs in minutes."

The language, dubbed English 210, is said to be free-form and easy to learn. The operator responds to step-by-step prompting messages at the bottom of the CRT screen to define report parameters shown at the top of the screen.

Any turnkey systems delivered by the firm in the last 18 months which include the STC Double Precision Executive can be retrofitted with the language for \$3,200, a spokesman said. Otherwise, the price is bundled into the turnkey price, he added from E-210 Rte.4, Paramus, N.J. 07652.

## DEC Users Get Clock Boards

PALO ALTO, Calif. — Digital Pathways, Inc. has two battery-powered accessory boards that provide calendar and real-time clock functions for Digital Equipment Corp. PDP-11 and LSI-11 minicomputers.

The units keep track of the correct date and time even when the mini's power is turned off, a spokesman claimed.

There is no need for the operator to enter time or date

information at any time, thus reducing the chance of error, he added.

The TCU-100 for the PDP-11 presents date and time when a read instruction is given by the operator. It can be preset to interrupt at specified times or regular intervals.

It can also be used to keep track of system downtime, even during power failures, the vendor said.

The TCU-50 unit for the

LSI-11 lacks the interrupt capability.

Both of the units can operate without computer power for up to three months on built-in rechargeable batteries. Each unit is contained on an edge connector circuit board that plugs directly into one of the mini's accessory slots.

The TCU-50 costs \$325 while the TCU-100 costs \$495 from Digital Pathways at 4151 Middlefield Road, Palo Alto, Calif. 94306.

## The new Hewlett-Packard Graphics Terminal uses a microprocessor and raster scan technology to combine high performance with low cost.

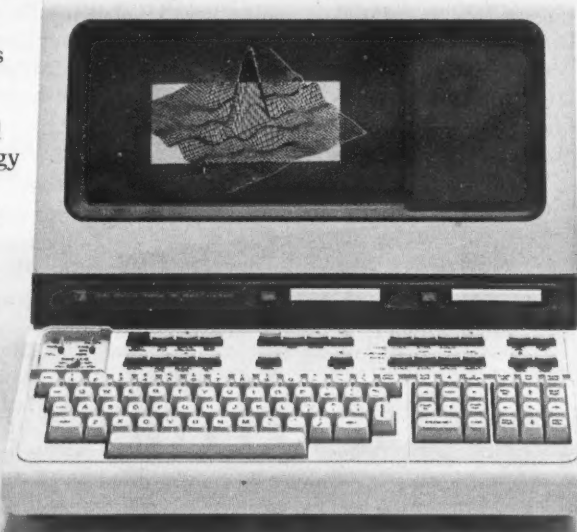
The HP 2648A introduces a whole range of bright ideas to graphics. There's so much power built into the terminal itself that you can perform everything from auto-plots to zoom without any CPU help at all.

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**Area Shading and Pattern Definition.** This makes it easy to distinguish areas with similar shapes, such as bar charts, mechanical parts and architectural drawings.



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Mail to: Ed Hayes, Marketing Manager, Hewlett-Packard Data Terminals Division, 19400 Homestead Road, Dept. 307, Cupertino, CA 95014.

427031 HP74

## Minis Move Data Quickly

(Continued from Page 31)

ports such as trailer utilization reports and a pattern report which shows equipment types needed by "origin state" and "destination state" that attempts to point sales people to where potential customers are likely to be located.

A position report gives the operations people and management an overview of what's happening and "is in effect a kind of a quickie backup."

"We are in the process of making it possible for the second system to absorb the workload of the first system" should the first system go down, Guyton said.

To do this requires a bit more disk storage. "We keep the 25M-byte disk on the dispatch Reality quite loaded, and the 20M-byte disk on the other Reality can't quite hold the system."

Anticipating a new operating system release for the system, Guyton said that as soon as it is distributed "we are going to dedicate the tape drive on the on-line system and, as we update a record, we will pass the updated records out with a peculiar key right to tape."

"That way, if we have a failure of the primary system, we would simply load the preceding day's saved files, update the files from the transaction log and be back in business."

Management information is transferred daily to the NCR system through tapes, he noted.

Microdata takes care of the service of the system, he said, and "I have had absolutely no problem with it."

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## 57 Vendors Represented

# Report From Datapro Details 144 Micros

By Frank Vaughan  
CW Staff

DELRAN, N.J. — The microprocessor and its logical extension, the microcomputer, are still the most exciting technological aspects of the DP industry, according to a report

## Micro Bytes

### Oliver Prom Programmer Handles TI 2708, 2716

N. HOLLYWOOD, Calif. — Oliver Audio Engineering, Inc.'s PP 2708/16 programmable read-only memory (Prom) programmer handles the Texas Instrument's 1K Model 2708 and 2K Model 2716 Proms.

The programmer contains address counters and timing and control logic and software. It also includes a power supply and case and five-ft cable, the firm said.

The unit can be connected with a parallel interface to a microcomputer.

The PP 2708/16 costs \$249 in kit form and \$299 assembled and tested from Oliver at 7330 Laurel Canyon Blvd., N. Hollywood, Calif. 91605.

### Show Set in Boston

BOSTON — Computermania, a computer show for businessmen and computing enthusiasts, will kick off at the Commonwealth Pier here Aug. 25-27.

Featuring over 400 exhibits of computers, calculators, video games, video recorders, programs and accessories, Computermania will also include a display on ham radio by Tufts University.

Tickets cost \$12 and can be obtained at the door.

### Kit Backs Altair Clock

ALBANY, Calif. — Parasitic Engineering has a permanent fix-kit for the Altair 8800 microprocessor clock.

The fix-kit reportedly decreases the clock's susceptibility to noise, temperature drift and other component variations.

The fix-kit contains instructions, components and other necessary parts. It installs directly on the Altair microprocessor unit (MPU) boards.

The kit sells for \$15 from Parasitic, which can be reached at P.O. Box 6314, Albany, Calif. 94706.

published by Datapro Research Corp.

"And while these products continue to amaze us with their vendors' feats of packaging progressively greater performance into smaller packages...we are merely witnessing another cycle of technological innovation proceeding from its infancy, through the various stages of applicational discovery, into full maturity," the report said.

Entitled "All About Microcomputer Specifications," the report noted there is not too much difference between this year's microcomputers and last year's. Primary differences come in the form of fewer integrated circuit requirements and denser memories at lower costs.

Another development has been in the availability of specialized I/O interface circuits, such as diskette controller chips.

"By combining these innovations, the spectrum of microcomputer offerings has begun to take on the performance characteristics of small minicomputers in exactly the same way that the minicomputers have recently begun to function more like their larger mainframe counterparts," the report observed.

The report discusses microcomputer and microprocessor development systems and their outgrowths. It also looks at OEM and hobbyist microcomputers.

One trend that continues to surprise the industry observers is the rapid growth of the hobby interests, Datapro said. Starting with the MITS Altair 8800 (an 8080-based kit product) and followed by the MITS 680 and Southwest Technical Products Model 6800 (both 6800-based computers), the interest in home-built computer systems is expected to

rival the interest in high-fidelity kits within a few years.

Several other companies have moved into this area and computer stores are springing up all around the U.S., the market research firm noted.

### Micros in Detail

The Datapro report presents the characteristics of 144 current microcomputers from 57 manufacturers in comparison charts. The information is on systems that are currently being shipped or are scheduled to be shipped by the third quarter of this year.

All information was supplied by the manufacturers during April and May of this year, Datapro said.

The categories in the comparison charts include packaging, which includes the number of boards, board dimensions, total number of chips and information on the power supply, control console and cabinet; and the microprocessor, which includes manufacturer and model, technology, data word size, instruction word size, clock frequency, add time for register-to-register in microseconds per data word, number of instructions, total number of registers, microprogrammability and availability of hardware arithmetic.

Other categories include information on I/O control, software, principal applications, pricing and availability and comments.

A list of addresses and telephone numbers of manufacturers whose products are summarized is also included in the report, which sells for \$12 from Datapro at 1805 Underwood Blvd., Delran, N.J. 08075.

### Reductions in 20% Range

## Altair 680B, 8800B Prices Cut

ALBUQUERQUE, N.M. — The Pertec Computer Corp. has announced price reductions in the 20% range on a variety of Altair personal computing items.

The reductions were made as a result of "manufacturing efficiencies," according to a spokesman.

The 8800B microprocessor unit (MPU) in kit form was reduced from \$875 to \$750, while the assembled version with 12 board slots was cut from \$1,175 to \$995. The cost of the assembled version with 18 board slots was dropped from \$1,250 to \$1,070.

The 8800B turnkey MPU in kit version was reduced from \$995 to \$795. The as-

sembled 12-slot version of the turnkey was cut from \$1,250 to \$995, while the 18 board-slot unit was reduced from \$1,395 to \$1,070.

### 680B Kits Drop

The 680B microcomputer kit was lowered in price from \$466 to \$395 and the assembled model from \$625 to \$495. The turnkey kit form of the 680B dropped in price from \$425 to \$350, while the assembled turnkey went from \$610 to \$450.

The Altair line of microcomputers is sold through a network of Altair Computer Stores.

CHICAGO — Midwesterners will have a personal computing show of their own when the Midwest Personal Computing Show debuts here Oct. 27-29.

Attendees will have an opportunity to win a Processor Technology B-190 kit with 16K bytes of memory, a system worth more than \$1,000, according to a spokesman for *Personal Computing Magazine*, sponsor of the show.

The show, which will be held in the Holiday Inn at O'Hare International Airport, will feature exhibits from programmable video games to inexpensive business management systems.

In addition to the product displays, a seminar program is being planned. The program will be of interest to entrepreneurs and businessmen who are interested in "getting a piece of the action in personal computing," the spokesman said.

Another event at the Chicago show will be

## Midwesterners Set to Get Own Show

"Everyone's Computer School." Conducted by Gene Murrow, president of Computer Power and Light, the "school" will teach the basics of programming to beginning users.

Participants will learn to program while sitting at a terminal, the spokesman noted.

Other seminars being planned include "New Approaches to Business Applications," "Introduction to Hardware," "Introduction to Software," "Computer Art and Music," "Computer Networks," "Computer Games of the Future," "Computing Is Schools," "The Home Computer — How Real is It?" and "The Threat of Government Intervention in Personal Computing."

The conference will conclude with a Saturday night banquet at the O'Hare Hyatt Regency Hotel.

Admission to the exhibit hall is \$10. Additional information is available from *Personal Computing Magazine*, 401 Louisiana S.E., Albuquerque, N.M. 87108.

MICROCOMPUTING

## System Allows S-100 Vocal Input

LOS ALTOS, Calif. — A system compatible with S-100 bus microcomputers that provides voice input and control and reportedly replaces keyboards in many instances has been introduced by Heuristics, Inc.

Speechlab digitizes and extracts data from a speech wave form and applies pattern-matching techniques to recognize the vocal input, a spokesman explained.

Technically the system features 64 bytes of storage per spoken word and a vocabulary of up to 64 words in memory, he said.

Other features include real-time response, 95% correct recognition, hardware self-test capability and CMOS design, he claimed.

Software includes Speech-basic Basic programming language, an Assembly

language speech-recognition program, Speechbasic plot, correlation, recognition and advanced recognition.

Speechlab is available for \$249 in kit form and \$299 assembled and tested. Included in the price is a complete

hardware/software system, a 275-page laboratory manual, 95-page hardware manual, high-fidelity microphone and three programs on paper tape.

Heuristics is at 900 N. San Antonio Road, Los Altos, Calif. 94022.

## Artec Board Goes to 32K

SAN CARLOS, Calif. — A memory board that can be built up in modular form to 32K bytes has been introduced by Artec Electronics, Inc.

The board is fully compatible with the S-100 data bus and speed-compatible with Zilog Z80-based systems, according to a spokesman.

The Model 32K-100 requires plus-8 single voltage only with a power usage of 3 amps, he said. Access time for the direct memory access (DMA)-compatible board is 250 nsec.

DMA compatibility allows users to access memory directly, without going through the microprocessor unit (MPU) on the microprocessor board, the spokesman explained.

The board, fully buffered on all address and data lines, also features battery backup to allow operation at reduced power consumption and a bank select provision permitting the selection of banks or

blocks of memory to address.

The basic board with all support circuits, power regulator, 8K bytes of memory and assembly manual sells for \$290. Additional 8K bytes of static random-access memory cost \$255 each and a full 32K memory board sells for \$1,055 from the firm at 605 Old County Road, San Carlos, Calif. 94070.

## Zilog Adds Three Boards

CUPERTINO, Calif. — Zilog, Inc., has expanded its series of Z80-based microcomputer boards by adding three programmer boards that allow users to program memory chips, according to a spokesman.

The Z80-PPB/Eprom Programmer Board was designed for programming 24-pin erasable programmable read-only memory (Eprom) chips of the 2708 or 2704 variety.

Another offering is the Z80-PPB/Prom programmer board for programming 16- and 24-pin Harris Corp. programmable read-only memory (Prom) chips of the 7620, 7621, 7640 or 7641 type.

Each board has software that permits users to program, verify, list and duplicate; each

costs \$475.

A composite version of the two boards is the Z80-CPB/-Prom. It duplicates the software capability of the other boards and costs \$575.

Zilog is at 10460 Bubb Road, Cupertino, Calif. 95014.

## Parasitic Kit Built on 8080

ALBANY, Calif. — Parasitic Engineering has introduced an 8080-based microcomputer kit that sells for under \$700.

The Equinox 100, according to a spokesman, eliminates the need for binary lights and toggle switches with its use of a 12-pad keyboard and a numeric 7-segment display.

Through firmware control, Equinox 100 users can utilize the front-panel keyboard and display to monitor or alter any register, register pair, memory location or I/O device in the system, he said.

The microcomputer can single-step through programs, slow-step at a programmable rate from 1- to 64K step/min or HALT at predetermined points without "going to sleep," he claimed.

The complete kit sells for \$699 from the firm at P.O. Box 6314, Albany, Calif. 94706.

## Kit Fans: Are You There?

The age of the microcomputer kit has dawned and the do-it-yourself computer has attained a degree of respectability that has surprised many people.

The concept of building one's own computer holds a great deal of interest for hobbyists and professionals alike. If sales figures can be believed, quite a few kits are in various stages of assembly throughout the country.

If you have either joyously succeeded or miserably failed at building a kit — or if you fall somewhere in between — and would like to share some of your experiences, *Computerworld* would like to hear from you.

Drop a short line to Frank Vaughan at *Computerworld*, 797 Washington St., Newton, Mass. 02160.

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## The New PCMs — Part 2

## Microcode Seen Future Market Strategy

By Toni Wiseman  
CW Staff

The ranks of plug-compatible mainframe manufacturers are swelling steadily as more and more vendors enter the market. Counterstrategies are expected from all sides — and a measured amount of retaliation is expected from IBM.

Just what the strategies of these plug-compatible manufacturers (PCM) will entail and how far they will go is open to conjecture. Industry observers, however, agree on one thing — microcode is going to play a large part in everyone's strategy.

Arthur D. Little's Frederic G. Withington said it isn't clear whether "the big guys are going to be able to fend off the little guys" by bundling systems programs through the use of microcode.

Amdahl Corp. in particular, he noted, is very imaginative, is spending money on R&D and will certainly have new hardware products. "And conceivably, with the help of Fujitsu, it may eventually be independent in software too, though that would be a long way off," he said.

"What we're seeing here is something that's never really forced itself on us before — the complete decoupling of software and hardware, with the operating system being the primary product, but being so big and so complex to change that it's vulnerable to attacks from every quarter," Withington stated.

The virtual machine concept is the way for mainframers to compete, according to Elinor Gebremedhin, project editor at Auerbach Publications said. She suggested that a viable strategy would be to design a machine in such a way that the user could put an operating system on it that would be effectively identical to the IBM operating system.

"Right now, mainframe manufacturers are tied up in their architecture design by the necessity to emulate their previous offerings," Gebremedhin said. "But they're freeing themselves from this constraint by developing the virtual machine. The problem is to do it efficiently enough to avoid performance degradation."

James Peacock, vice-president of International Data Corp., sees problems ahead for both users and PCMs as microcode and pre-designed circuits handle more and more software functions. For this reason, he predicted, plug-compatible machines are only a short-term solution.

"Looking at it from the user's standpoint [plug-compatible CPUs] are a very good solution for users who are committed to IBM software, but this approach presupposes the availability of IBM software," Peacock noted.

*This is the second article in a three-part series that takes a look at the competitive plug-compatible mainframe market.*

*Part 3 will examine the competitive scene from the viewpoint of securities analysts who follow the industry.*

As hardware and software become more and more intertwined, a plug-compatible machine could create problems for the user who wants to keep up with IBM, he said.

"All that the PCMs are saying now is that if you're running IBM software, they can save you money on your hardware. If I, as a

user, feel the system I have, or this type of system, is going to be adequate for the next five years, and I am willing to live with the type of software I have, then this looks like a very attractive approach.

"But if I am up against a wall, if I have problems that I don't think I can handle with the current architecture of the machine and I'm looking to IBM or some other manufacturer for a new solution, that's another story.

"In that case I wouldn't think I as a user would be very secure in going to an IBM-compatible machine, because I would think I wouldn't be able to get whatever IBM offers," Peacock explained.

Art Yerkes, Datapro Research Corp.'s mainframe editor, also believes the virtual machine is the likely strategy. With microprocessor machines it is entirely feasible, if somewhat difficult, to design a machine which could run

(Continued on Page 38)

## Study Finds SBS-Type Ventures Need Large Infusions of Capital

By Toni Wiseman  
CW Staff

PALO ALTO, Calif. — The telecommunications industry is characterized as being highly capital-intensive and requiring long-term capital investment — implications evident in the Satellite Business Systems (SBS) venture, according to Comquest Corp., a market research firm.

The partners in SBS — IBM, Comsat General Corp. and Aetna Life & Casualty — have projected expenditures in excess of \$680 million by 1986, when the seven-year life of the first generation of satellites ends, Comquest said.

Of this amount, \$250 million will be pre-operational expenses for the period up to July or August 1979. The remaining \$430 million will be expended in the operational phase to 1986, the report said.

Approximately 60% of the total expenditures will be for plant investment, including satellites and earth stations; the remaining 40% will be for administration, marketing and other operating expenses, Comquest noted.

A more detailed breakdown from the firm

showed 18.9% for the space segment, 12.8% for 5-meter antenna stations, 8.5% for 7-meter antenna stations, 1.4% for systems management facility, 16.8% for system development, 26.5% for administration and headquarters, 10.8% for operations and maintenance and 4.3% for spare parts.

Comquest analyzed the expenditures and revenue requirements resulting from the installation of 375 earth stations by 1983. "For a simplified break-even cash flow analysis through 1986, required average monthly revenues needed to accrue to SBS for each earth station would be \$28,500," it reported.

In Comquest's estimation of SBS' break-even condition, the maximum negative cash position will occur in 1981, with net cumulative expenditures of some \$330 million — 10 years after the founding of the original CML Satellite Corp. and six years after the founding of SBS.

"With all earth stations installed and producing revenue, the system revenues' requirement for break-even would be approximately \$127 million per year.

"Assuming an income distribution from

(Continued on Page 38)

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# Study Finds Communications Capital-Intensive

(Continued from Page 37)

both IBM services roughly proportional to demand for equivalent voice circuits, the annual system revenues for the breakeven case would be: low-speed data, \$12.2 million; medium-speed data, \$16.3 million; high-speed data, \$35.8 million; voice circuits, \$62.7 million," the report observed.

"With the revenue-producing features of demand assignment and voice activity compression, these numbers appear attainable for SBS when compared with private-line revenues for other domestic satellite operators," the report stated.

Entry into domestic satellite operation is theoretically open to any company which has the financial staying power and the available technology, Comquest indicated, citing Control

Data Corp., Burroughs, Honeywell, Univac, NCR and possibly Memorex, Dataproducts or Ampex as potential candidates.

"In general, computer companies will be well-qualified technologically in the areas of digital signal and digital data processing. In addition to this technology, they will also require the satellite communications technology in order to even qualify for [Federal Communications Commission] (FCC) construction permits," the report stated.

This means a computer-based firm can either develop in-house capability or form a partnership with a communications-based entity, it noted. While Comsat-General is an obvious potential partner, RCA, Western Union and American Satellite Corp. are

also viable, it added.

Satellite equipment manufacturers such as Collins Radio Group, Hughes Aircraft and ITT Space Communications are also possible partners for joint ventures, it said.

"Comsat-General's association with IBM would not necessarily rule it out as a venture partner with another computer manufacturer," Comquest observed. "However, Comsat-General's ability to take on the added financial strain is questionable."

"The financial investment for 'roof-top' satellite operation will probably incur a peak negative cash flow of \$250 million to \$350 million including space and ground segments."

## Foot in the Door

Comquest suggested computer-based firms could get their foot in the door by using SBS' common carrier facilities as soon as they become operational — traffic SBS will be obligated to accept as a common carrier.

"This will allow experimentation

with the direct transmission of high-speed data from computer to computer via satellite — without having to reduce to voice-band rates the multimegabit per second internal transmission rates of the computer," the report said.

What about IBM and its required "arm's-length" relationship with SBS?

At present 45 (51%) of the 88 members of the SBS staff are employees.

"This situation cannot be allowed to endure following FCC approval since no employees of IBM, Comsat or Aetna can be on the staff of SBS," Comquest said.

"Basically the FCC requirement is that IBM should be involved only in the policymaking process for SBS through the Partnership Committee. But IBM must be separated from the operational aspects of SBS."

"There is obviously a grey area where policymaking ends and operating procedures begin. This is likely to be a continuous bone of contention with the FCC," the report stated.

## CI Notes

### Aetna Subsidiary OKs Participation in SBS

McLEAN, Va. — A subsidiary of Aetna Casualty and Surety Co. has initiated its financial participation in Satellite Business Systems (SBS) in accordance with the SBS partnership agreement.

Under the partnership agreement, Aetna, since the inception of the SBS partnership in 1975, has been participating with Comsat General Corp. and IBM as an equal partner in the management of SBS.

Initial financial participation by Aetna and continuing financial participation by Comsat General and IBM, however, depended on their determination that the SBS Order issued by the Federal Communications Commission last Feb. 8 provides a satisfactory basis for proceeding with the venture.

That determination has now been made, according to SBS.

### IBM Starts New Division

ARMONK, N.Y. — IBM has established a General Technology Division in its General Business Group.

The division, which will be responsible for semiconductor development and manufacturing, includes the Burlington, Vt., components plant and laboratory and the Manassas, Va., components laboratory.

The company also announced the Manassas laboratory will be relocated to Burlington. Both facilities were previously part of the System Products Division.

The Federal Systems Division, principal occupant of the Manassas site, is not affected by the transfer.

### Xerox Makes Offer for Shugart

STAMFORD, Conn. — Xerox Corp. and Shugart Associates have signed a letter of intent leading toward acquisition of Shugart by Xerox.

The companies expect to reach final agreement within 60 days and complete the transaction by year-end. No details were revealed except that Shugart would continue under its present management and be operated as a Xerox subsidiary.

Shugart manufactures rotating memories, including flexible disk drives, a business Xerox is already in through the manufacture of cartridge disk drives by Diablo Systems, Inc.

## Microcode in PCM Future

(Continued from Page 37)

both IBM and non-IBM operating systems with interchangeable boards, he noted.

However, there is another problem on the horizon for PCMs. As more and more software functions are integrated into hardware, PCMs are going to be put in an impossible position, Yerkes said.

"I don't see IBM losing any money over counterstrategies, going into programs that are going to cost it money," he said. "But as it develops new products, it will look for alternatives through new technology that don't cost any more money but do ace out the others."

The more IBM puts the decoding right in the devices themselves — such as disk drives — so that decoding is done not in the CPU but at the controller interface level, the less PCMs will be able to follow, he contended.

To what extent will the giant do this? Yerkes doesn't believe IBM will completely "ace out" the PCMs because, he said, if IBM obliterates the PCMs,

the Justice Department will surely close it down or break it up.

"I believe [IBM] will purposely leave enough margin in there for the PCMs just so its legal department can say, 'What do you mean we're a monopoly? Look at all those other people out there making money off our products.'"

"IBM virtually needs the PCMs to make its case to the Justice Department," Yerkes said, adding he personally agrees with economist Alan McAdams, a U.S. vs. IBM trial witness, that IBM is a monopoly.

ADL's Withington noted that despite IBM's counterattacks on all types of PCMs in the past, "it's interesting they do still live. The better disk, tape and memory makers are still in business and they are making money."

"But they have been restrained by IBM to a position of perhaps tolerance."

"So if that's a guide, then the CPU makers may very well live. The question is, how much of IBM's market will they be allowed to take away?" Withington observed.



# Don't Think



# In Computer, Communications Industries Capital Investment Funds Scarce, Congress Told

By Edith Holmes  
CW Staff

WASHINGTON, D.C. — Money for capital investment has become as scarce a resource in the computer and communications industries as energy resources have become in the economy as a whole, Congress was told recently.

Speaking before the Joint Economic Committee's Subcommittee on Economic Growth and Stabilization, the Computer & Communications Industry Association (CCIA) warned the availability of capital will affect the way these industries continue to develop.

Capital requirements over the next five years for companies making small computers are estimated at \$500 million and for companies making larger

mainframes at over \$1 billion, excluding the needs of IBM.

Further, the CCIA noted the microcomputer industry — spawned from earlier risk investments in the semiconductor industry — requires \$400 million in outside capital for sustained growth between now and 1982.

CCIA President A.G.W. (Jack) Bidle was joined in the industry presentation of capital problems by Ryal R. Poppa, president and chief executive officer of Pertec Computer Corp., and Erwin Tomash, chairman of the board of Dataproducts Corp.

Together, these industry representatives called for Congress to establish a graduated corporate income tax, deductible expense treatment for dividends and a return to lower tax-

ation of capital gains.

Poppa told the committee "the corporate tax rate of 48% hits the small and medium-sized corporate taxpayers and giant taxpayers alike." He argued the same principle of fairness and equity expressed in progressive personal tax rates should be carried over into corporate taxation.

Companies in their early growth years face heavy start-up costs and elusive profits, Poppa explained. "If smaller companies were taxed at a lower rate, retained earnings in the earlier years would be healthier and more stable, thus forming a more reliable source of internal financing to ensure their early growth periods."

## Progressive Taxation

Poppa provided the subcommittee, which is chaired by Sen. Lloyd Bentsen (D-Texas), with a sample of a progressive tax rate schedule graduated according to a corporation's ability to pay. Under his proposed tax schedule, for example, a company with pretax income up to \$50,000 would be taxed at a rate of 20%.

A company making between \$350,000 and \$400,000 would pay the government at a rate of 27%; the firm with an income of between \$500,000 and \$1 million would pay between 30% and 35%; and the corporation making over \$500 million annually would be taxed at 70%.

Poppa also urged the retention of domestic international sales corporations (Disc) for small and medium-sized companies.

While noting Sen. Edward Kennedy's (D-Mass) condemnation of Discs as a "billion dollar annual giveaway to upper levels of the Fortune 500," Poppa argued smaller U.S. businesses need Discs to maintain their export operations.

Poppa suggested the subcommittee ensure against misuse of Discs by "limiting Discs to small and medium-sized corporations — those with capital accounts under \$200 million — or by limiting the deferral permitted a given corporation in accordance with its capital account."

Tomash focused on the need to bol-

ster the "faltering equity market. The Tax Reform Act of 1976, with its minimum tax and tax preferences provisions relative to capital gains, has all but eliminated reasonable after-tax rewards for the private investor," he said.

Rather than eliminate all special capital gains treatment, he urged President Carter act "to provide incentives for continued and new investment in our nation's industries."

## Double Taxation

The elimination of double taxation of dividends would also provide some relief, Tomash said. However, "such tax reform would tend to benefit only the larger companies that are able to pay dividends."

"Certainly, if dividends were treated as a deductible expense, as is interest on borrowings, equity capital would be more competitive with debt equity," he continued.

But "we cannot trade capital gains reform for the elimination of double taxation of dividends," Tomash told the subcommittee. "The elimination of favorable treatment of capital gains would further isolate the small- and medium-sized companies from the capital market and, with dividend deductions available to larger companies, the capital drawing power of the large corporation over the financial markets would be assured."

## Confabs Slated This Week

### SigCPR to Meet CCIA to Gather

ARLINGTON, Va. — The 15th annual conference of the Association for Computing Machinery's (ACM) Special Interest Group on Computer Personnel Research (SigCPR) will be held here Aug. 18-19 at Stouffer's National Center Hotel.

Keynoting the national conference on team dynamics in systems development and management will be Gerald M. Weinberg, author of the *The Psychology of Computer Programming*.

Dr. Thomas W. Plum of Yourdon, Inc. will speak on innovative team concepts while Paul Oyer, president of the Federal Automatic Data Processing Users Group (Fadpub), will chair a panel on "Organizational Dynamics: How About Teams of Teams?"

Twenty-one papers will be presented in six sessions.

The registration fee for the conference is \$75, with reduced fees of \$60 for ACM or SigCPR members and \$25 for full-time students.

Further information is available from the conference chairman, Fred Harold of the U.S. Civil Service Commission, Washington, D.C. 20415, at (202) 632-5650.

CHICAGO — Harry Newton, an independent telecommunications marketing consultant and writer, will be a guest speaker at the Computer & Communications Industry Association's (CCIA) fifth annual meeting Aug. 18-19 at the Hyatt Regency here.

Newton will deliver an address on "Success and Failure in the Telecommunications Industry: How to Achieve One and avoid the Other."

Also speaking at the meeting will be James Peacock of International Data Corp., who will discuss his "unpublished" insights into and analyses of the implications of recent IBM product announcements and pricing.

Finally, the CCIA meeting will include an overview by Dr. Les Gunderson, technical director of Corning Glassworks Telecommunications Products Division, on the potential of fiber optics technology.

These sessions are open to industry chief executives who are not CCIA members but wish to attend. The CCIA is located at Suite 512, 1500 Wilson Blvd., Arlington, Virginia, 22209.

## System Coming

SAN ANTONIO, Texas — Datapoint Corp. is expected to introduce a small business floppy disk-system with a price tag of under \$6,000 next month.

According to industry sources, the 32K system will include a microprocessor CPU, 32K of memory, a CRT and two diskette drives for a total storage capacity of 500K bytes.

The system is said to be compatible with the rest of the Datapoint family of systems and will run two jobs concurrently. It will be sold on a purchase-only basis.

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## Sweda Expands Paper Tape Offerings

PINE BROOK, N.J. — Several paper tape devices have been unveiled by Sweda International. Additions to the Roytron line of desktop units include three models in the Series 1560 combination reader punch line; a Series 1060 punch-only unit and a Series 1250 reader-only unit.

Other introductions include a paper

tape rewinder and a winder.

The Series 1560 punches 5- to 8-level

### OEM Products

tape at 60 char/sec and reads at 240 char./sec in synchronous mode.

The models 1560-AS and 1560-T have RS-232C-compatible interfaces. The 1560-AS was designed to operate with a terminal device on the same serial data lines while the Model 1560-T was designed to simulate a terminal device and uses a dedicated serial port.

The two versions of the Series 1060 punch-only unit, the 1060-AS and the 1060-P, have a RS-232C-compatible interface and a parallel TTL-level interface respectively.

The Model 1250-P can be slewed up to 240 char./sec. The 1250-AS generates data up to 2,400 bit/sec, the firm said.

The Model 92-C is a self-contained desktop paper tape rewinder; the Model 94 winder attaches to the punch housing.

OEM discounts apply to the products, Sweda said. Prices per single unit are: Model 1560-P, \$1,695; Model 1560-AS, \$2,250; Model 1560-T, \$2,195; Model 1060-AS, \$1,550; Model 1060-P, \$1,295; Model 1250-P, \$1,250; Model 1250-AS, \$1,350; Model 92-C, \$110; and the Model 94, \$98.50.

Sweda International's OEM Products Division is at 34 Maple Ave., Pine Brook, N.J. 07058.

## Drive Bows

MINNEAPOLIS — Control Data Corp.'s Model 9406 flexible disk drive handles double-sided, single- or double-density IBM-compatible diskettes and provides unformatted storage capacity of 1.6M bytes, the firm said.

The Model 9406 supports formats in either hard- or soft-sector operation.

CDC has also introduced the Model 9474 drive subsystem which accommodates up to four drives in a configuration with up to 6.4M bytes of unformatted capacity.

The 9406 operates with data formatting and timings resident in the host controller, CDC said.

Access time for both single- and double-density versions of the disk is 6 msec track-to-track; the recording density is 48 track/in., the firm said.

The Model 9474 uses the Intel 8080 to control drive operations.

Single units of the two-sided CDC 9406 cost \$775, about 25% higher than the single-sided CDC 9404.

A Model 9474 subsystem with controller ranges in price from \$2,600 for a single-drive configuration to \$5,200 for four drives. Quantity discounts are available.

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## Tandon Adds Ferrite Head

CHATSWORTH, Calif. — An IBM-compatible double-sized ferrite recording head for floppy disk drives has been developed by Tandon Magnetics Corp.

The Series 200 is compatible with the IBM-type swing arm assembly which facilitates loading and unloading of diskettes, the firm said.

The heads meet the requirements of double-density recording, feature tunnel erase and have the same electrical characteristics as industry-standard, single-sided heads, a spokesman added.

Tandon will supply the double-sided heads unmounted or mounted and aligned in an OEM's carriage. The design allows loading of the two read/write heads simultaneously on both sides of the disk.

The heads cost under \$50 in OEM quantities from Tandon at 20731 Prairie St., Chatsworth, Calif. 91311.

## Gulton Printheads Handle Mixed Data

METUCHEN, N.J. — Gulton Industries, Inc.'s DM1099 and DM10101 thick-film dot-matrix thermal printheads permit simultaneous printing of analog, graphic and alphanumeric data, according to the firm.

Each printhead contains a single continuous row of printing elements on a pitch of 50 point/in. Each dot is composed of two halves printing parallel.

The DM10101 contains a total of 101 dot elements where the 101st dot is for applications requiring both a zero and 100th data point. The DM1099 contains 99 dot elements to be used in conjunction with the DM10101 for data expansion.

Units are priced at \$121.20 in single quantities through \$75.75 in the 100- to 499-unit range from Gulton's Hybrid Microcircuit Department, 212 Durham Ave., Metuchen, N.J. 08840.



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## Data Processing Opportunities

### San Francisco Peninsula

Siliconix, a growing company in the semiconductor industry for 15 years, continues to excel in profit and reliability, and that means exciting and STABLE career opportunities for qualified professionals in our Information Services Group. Join us now if you qualify:

### SYSTEMS ANALYST

Excellent position for an Information Systems Analyst to work with management defining systems objectives, establishing detailed requirements, preparing user documentation and training users in systems operations. BS in Business or Math with 4-6 years' work related experience.

### PROGRAMMER

The successful candidate will participate in the development of on-line manufacturing information systems. You will be working in an IBM/370 environment. 1-3 years' experience will qualify you.

If you're ready for pleasant year 'round weather, easy access to fine schools, theatre and water activities, then join us now. You can expect a good salary and liberal benefits including dental insurance, profit sharing, tuition assistance, relocation assistance, and a stock purchase plan. For immediate consideration, please send your resume to Professional Employment, 2201 Laurelwood Road, Santa Clara, CA 95054, or call COLLECT (408) 246-8000, Ext. 233. An affirmative action employer.

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# Grow with Amdahl and be a part of the future.

## Software Opportunities

*Are you good at diagnosing  
system level problems? Amdahl needs...*

### FIELD SUPPORT REPRESENTATIVES

You should be able to work on your own in the resolution of complex system level problems encountered by Amdahl users. You should have good MVS internals experience plus expertise in one or more of the following components or subsystems:

- VTAM/NCP
- JES3
- IMS
- VSAM
- TCAM/TSO
- CICS

Current openings are in the San Francisco Bay Area.

*Can you accept the challenge of creating an  
error free system? How: by building test cases that  
really put all operating system components through a  
real test. If so, Amdahl needs you as a...*

### SOFTWARE QUALITY CONTROL SPECIALIST

to generate, apply and verify VS1, SVS, VM or MVS software and material distributed to our Amdahl customers. You should have a close working knowledge of the VS1, SVS, VM or MVS operating system internals, utilities, SMP and assembler language. Current openings are in the San Francisco Bay Area.

*Can you build a better mousetrap? Amdahl needs...*

### SOFTWARE SYSTEMS MAINTENANCE SPECIALISTS

to create all Amdahl SCP maintenance materials. You should possess a detailed knowledge of the VS1, MVS, VM or SVS operating system internals as well as a good working knowledge of utilities, SMP and assembler language. Current openings are in the San Francisco Bay Area.

*Do you enjoy customer contact? Amdahl needs...*

### FIELD SYSTEMS ENGINEERS

at customer locations. You need the ability to handle problems encountered on a daily basis in a large commercial data processing environment. You should have good diagnostic expertise in VS1, SVS, VM or MVS and the ability to be a jack-of-all-trades. Currently there are several openings throughout the United States.

*Do you enjoy traveling? Amdahl needs...*

### HEADQUARTERS SYSTEM ENGINEERS

to work with Field Systems Engineers at customer locations solving difficult problems. You will also assist customers and Field Systems Engineers in the complex area of system performance and tuning. You should have very good diagnostic techniques and MVS, VS1, VM or SVS internals experience. Current openings are in the San Francisco Bay Area.

*Have you been active in recent  
MVS conversions? Amdahl needs...*

### MVS CONVERSION SPECIALISTS

to work closely with Field Systems Engineers and Amdahl customers converting to MVS. You should have several years' MVS internals and externals experience, as well as either JES2 or JES3 expertise. Opportunities available for extended travel. Current openings are in the San Francisco Bay Area.

*Do you enjoy teaching? Amdahl needs...*

### SYSTEMS ENGINEERING INSTRUCTORS

to teach MVS or JES3 classes for our Field Systems Engineers. You should have current experience teaching MVS or JES3 internals. Current openings are in the San Francisco Bay Area.

### ASP/JES3

Amdahl is looking for people with detailed knowledge of ASP or JES3. Opportunities exist in many functional areas of system programming. Current openings are in the San Francisco Bay Area and throughout the United States.

Send your resume to Phil Beckhelm, Amdahl Corporation, Department A01, 1250 East Arques Avenue, Sunnyvale, CA 94086, or call Michele Edson collect at 408/735-4500 between 9:00 AM. and 4:00 PM. We are, of course, an equal opportunity employer.

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- PERFORMANCE MEASUREMENT  
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- SOFTWARE CONFIGURATION MANAGEMENT  
(Design, develop programs to support software testing, release and repair.)
- SOFTWARE DEVELOPMENT  
(Design/implementation of multi-program O/S in a high level language. Experience desired in data base or telecommunications, distributive processing, virtual machine, time sharing.)

Employees will enjoy excellent salary and top working conditions with a commercial employer. Fully paid life, hospital and medical plan for employees and dependents, generous relocation allowance.

Please send resume immediately including salary history, training and experience to the Professional Placement Office at the address below.

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If your career path is in sales, this is a unique growth opportunity for aggressive, enthusiastic Data Processing or Communications Professionals. We are a full line computer terminal company breaking away from the pack with an exciting new product. A sophisticated microprocessor based flexible disk controller with an untapped, wide open marketplace. Full management and technical support. The most advanced field service capability in the business. Excellent compensation through salary and commission. To explore this sales opportunity call Mr. Hansen at 800 631-7050 Ext. 423 or write to Personnel Dept.



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Informatics PMI is now staffing for INTERCOMM accounts on a national level. Applicants include material control, manufacturing, construction and utilities. We offer qualified applicants a full-time permanent position at competitive salary, significant job responsibility, superior benefit package including travel incentive and a genuine professional environment in which to grow. If you have at least 1 year of INTERCOMM experience using 3270's and 2 years of COBOL, please submit your resume with current salary to: Informatics PMI, 1121 San Antonio Rd., Palo Alto, Calif. 94303.

**informatics inc**



Member SIA Software Industry Association



## COMPUTER PROFESSIONALS MVS JES-3 CICS

Our continued strong commitment to the development and installation of sophisticated financial applications and software techniques creates a number of positions which are available in our information services department. We are searching for those computer professionals who desire to join a team which will remain leaders in our industry.

### PROJECT MANAGERS

Individuals will be responsible for the overall direction of the various disciplines required in the design and implementation of financial and business systems. Involvement with design of EDP systems and project management of at least 5 years is required. Formal training in computer science an advantage and may be substituted for some of the experience requirements.

### SENIOR PROGRAMMER ANALYSTS

ANS COBOL experience of at least three to five years in a business or financial environment is essential. We desire familiarity with: DBMS, DB/DC, CICS, ALC or file access methods. Experience with hierarchical design will be helpful. Will be assigned to complex projects of design and implementation. Excellent communication skills necessary because of heavy user contact.

### PROGRAMMER ANALYSTS

Requires fluency in COBOL and background including IBM 370 using MVS and OS/JCL. These individuals must have a system background of at least two to three years. Also must be capable of involved and complex system and program design. Excellent communications skills important. On-line program development experience a plus.

These are positions which will require individuals who are willing to accept unusual challenge and responsibility. We offer involvement in one of the most progressive sites in the industry. Compensation will be commensurate with background. We offer competitive benefits and a very desirable Western New York location. Please send resume including salary history and requirements to: Robert J. Woepel, Manager - Employment, Marine Midland Bank, One Marine Midland Center, Buffalo, New York 14240.



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## FIELD SERVICE ENGINEER

Growing Hospital Systems Co. needs engineer for onsite maintenance of large Eclipse-based on-line hospital system in Washington, D.C. Must have at least 2 years experience on Data General computers, including Eclipse C-300, 4231 drives, and 4257 multiplexors. Informal working environment. Salary competitive based on experience. Send resume including salary, history to: CW Box 5133, 797 Washington St., Newton, Mass. 02160.

## SYSTEMS MANAGER

Salary area  
\$45,000

Our client, one of the nation's leading retailers is converting to point of sale systems throughout its thirty-four state chain. Relocation to dynamic Houston, Texas is just one of the benefits to taking over this top P.O.S. post. For further information, contact Tom Fischer at (713) 658-9898.

ALL FEES ASSUMED  
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M. David Lose  
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## PROGRAMMER

Minimum of 3 years experience with minicomputers, growth opportunity with Farmingdale, L.I. Service Bureau. Salary Open. Call (516) 249-0860 ask for Mr. K.

## Dean of Administrative Services, for Northeastern University.

Reporting to the Vice President for Administration, the Dean will provide overall leadership in the planning, use and management of EDP resources, including future systems development planning. In addition, the Dean will evaluate costs and benefits of enhancing existing information systems, and of implementing a data base approach to computer systems. Initial areas of responsibility will include Academic and Administrative Computer Centers and the Office of the Registrar. The University is consolidating all EDP resources to provide data processing support to all operations, including Finance.

The position requires a thorough knowledge of state-of-the-art hardware and software, as well as experience in major software conversions; a background in planning and coordinating information systems would be valuable. Candidates should also have familiarity with application programming and systems design, with strong management skills and administrative experience in managing a major academic and/or administrative computation center. A Master's degree is preferred.

Salary is negotiable; It, and the benefits package that go with it, will be attractive.

Please write, including a resume and salary history to John A. Curry, Vice President for Administration, 175 Richards Hall, before August 15, 1977.

**Northeastern University**

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# Advanced Software Design

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Telecommunications is one of the most rapidly growing segments of the software frontier. We have major projects underway now . . . forerunners of our long-term commitment to significantly advancing the state-of-the-art. We're working from definition and design through development and implementation in areas such as CAD, Data Base Systems, Simulation, Fault Recovery, Diagnostics and many areas of software design in an on-line, real-time environment.

## Software Design

We're looking for an indepth background in the development of systems software and a minimum of 3 years' experience in structured design, testing and documentation of programs running on large data base, multi-file systems in real-time. Familiarity with HIPO design documentation, TSO usage and software simulation techniques as well as PL1, Fortran and assembler languages for the 8080 and PDP 11 programming is also important.

## Data Base Design

This position requires a minimum of 5 years' experience in the planning development, design and implementation of data base software, including data base management systems administration. Your primary responsibilities will be the development of data base system for a large on-going project including the implementation, support and administration of systems.

## Computer Aided Design

We are looking for an extensive background in the design of CAD/CAM systems and the development of Interactive access by the users of CAD/CAM functions. Required is 5-10 years' experience in both hardware and software aspects; DA systems operations, and design, and systems engineering. Your initial responsibilities will include evaluation of existing systems, and working with a project team in the Architectural Planning of a major new system.

## Mini-Computer Programmers

We have specific assignments available on project development teams responsible for the design implementation of various telecommunication processing systems utilizing mini-computers as the processing element. Responsibilities will include the development of software programs for real-time operating systems as well as unique hardware elements incorporated into the systems.

If you have in-depth expertise in one or more of these areas, a BS, MS or PhD in Electrical Engineering, Computer Science, Math or other appropriate engineering discipline and have an interest in moving forward with one of the challenging new frontiers in computer technology, talk with us.

**If unable to call, please send your resume to:  
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## MINICOMPUTER/MICROCOMPUTER SOFTWARE POSITIONS

Openings currently exist at all levels for software personnel possessing a background in the following areas:

- Microprocessors
- Minicomputers
- Operating Systems
- Systems Simulation
- Systems Constructors & Generators
- 8080 Assembly
- Assembly & COBOL Languages

Requires a BS/MS in CS, EE, or Math.

We welcome responses from new graduates as well as experienced personnel.

The above positions are located at NCR's Terminal Systems Division in Dayton, Ohio. Our Engineering Staff is a leader in the design and implementation of Financial Terminal Systems. Dayton is a progressive midwestern area, small enough to be friendly but large enough to offer outstanding communities with excellent housing, educational facilities and cultural activities.

Submit your resume and salary requirements to:

Employment Department CW815  
Terminal Systems Division  
NCR Corporation  
Dayton, Ohio 45479

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CPU

## DATA PROCESSING PROGRAMMER - ANALYST POSITIONS

Expanding computer applications in rapid growth company has created several additional openings in our Data Processing Division.

- Career Positions
- Professional Work Environment
- Individual Growth and Development

Two to six years experience in Systems and/or Programming is necessary. H-600/6000/66, COBOL, IDS, TDS & GMAP desirable but not mandatory. Experience in Teleprocessing and On-line Data Base applications would be an asset. A four year college degree is preferred. Excellent salary structure and fringe benefit program. Please submit resume with salary history in confidence to Personnel Manager:

FS SERVICES, INC.  
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### RENSSELAER POLYTECHNIC INSTITUTE

Troy, New York

RPI is a technologically oriented private university of 4000 undergraduate and 1500 graduate students. Talented individuals in the following areas are being sought to help prepare for installation and to support a new large scale system. Academic experience highly desirable for all positions.

#### SYSTEMS PROGRAMMER

Assist in the development and maintenance of the MTS operating system. Desire minimum 3 years experience in large scale systems support for OS/VS, VM/CMS, MTS, or equivalent.

#### COMMUNICATIONS

#### SYSTEMS PROGRAMMER

Responsibilities for all aspects of planning and implementing distributed communications support between central facility and remote terminals/minis/micros/data analyzers. Req hardware-level knowledge of communications equipment and protocols. A minimum 3 years systems programming experience on large systems and minicomputers.

#### ACADEMIC CONSULTANT

Consultant with academic users; train and coordinate graduate student consultants. Req broad knowledge of computing languages; programming experience. Applications and supervisory experience desirable.

#### COMPUTER LANGUAGE

#### SUPPORT

Responsible for maintenance, installation, and enhancement of all compilers. Req systems programming experience and broad knowledge of computing languages on large scale systems.

RPI is an Equal Opportunity/Affirmative Action Employer. Send resume, 3 professional references and salary requirements by September 15 to: Manager of Recruitment, Personnel Department, R.P.I., 110-8th Street, Troy, N.Y. 12181.

### DATA PROCESSING SUPERVISOR

Data Processing Division  
Community Services Department

This supervisory position is responsible for the operation of an electronic data processing unit including systems analysis, programming, and machine operation for an IBM System 3, Model 12, disk system. Ability to work with RPG-II, CCP and knowledge of OCL required.

Thorough knowledge of principles and techniques of program planning, machine scheduling, card and form design, and control requirements essential. Experience in supervising a data processing unit desirable. Ability to analyze complex data processing problems and institute effective programming procedures mandatory.

Selection will be based upon review of experience and oral interview.

Salary Range: \$1,446-\$1,807 Mo.  
Closing Date: Indefinite

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## Senior Programmer

Excellent career position and high development potential with multi-million dollar international textile manufacturer for individual with 2-3 years general business applications experience. Strong knowledge of IBM 370, DOS/VS, COBOL, plus familiarity with RPG required. Exposure to teleprocessing using IBM 3270 terminals and any commercially available teleprocessing task monitor a plus. Convenient mid-Manhattan location.

Salary in high teens.

Please send resume and salary history to Corporate Personnel Manager, DHJ Industries, Inc., 1345 Avenue of the Americas, New York, N.Y. 10019.

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## PROGRAMMER/ ANALYST

Opening for Programmer with 3 years experience including 1 or 2 years in Analysis. Hospital background a plus. On-line experience, MUMPS or ASSEMBLER background required. Attractive salary and benefit program. Send resume or call:

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First of a Series of Six



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We have positions available in every area of data processing. So, if the above interests you, call us toll free: 800-543-7583, or

send your resume to:

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DAYTON AIRPORT OFFICE

212 West National Road, Vandalia, Ohio 45377  
In Ohio Call Collect: 513-890-1200

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# Senior Systems Analyst

Hughes' Computing and Data Processing Department has a requirement for an individual with a strong background in systems analysis, specification and design.

### Experience must include:

- Problem definition, feasibility analysis, and economic justification.
- Preparation of user requirements specifications.
- Specification and design of on-line and interactive systems including the use of IMS and S2K Data Base Management Systems and Data Communications.
- Hardware evaluation and selection (for particular application) ranging from small-scale, stand-alone, mini computers to large-scale, main frames.
- Software package evaluation and selection.

The individual we are seeking will have a combination of technical, business, and interpersonal skills, coupled with maturity and sound judgment. These skills should encompass:

- Ability to provide an effective link between the user and data processing communities.
- An indepth knowledge of the broad range of user disciplines found in an aerospace company.
- Familiarity with a broad range of hardware, software, and programming languages.
- Good oral and written communication skills.
- A sense of urgency in keeping current with data processing industry technological developments.

If your experience and interest match these requirements, please send your resume, including salary history to: Professional Staffing, Support Systems Division, P.O. Box 90515, Los Angeles, CA 90009.

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# Mini-Computer Systems Hardware & Software Development



## A window on a special kind of future

If you've got the potential, we'll give you every opportunity to fulfill your career goals. How can we make this kind of promise? Easily! We intend to double in size within the next year, and this kind of expansion means ground floor opportunities. We have a virtual abundance of openings for top talent in the following areas:

### DEVELOPMENT ENGINEERING Computer Development Engineers

Responsibilities will include the digital design and checkout of high performance mini-computers and I/O processors. Positions require a BS or MSEE and a minimum of 2 years experience in microprogrammed CPU design utilizing high speed TTL logic. Specific experience in memory management and channel design is necessary; a good working knowledge of computer architecture is preferred.

### Controller Development Engineers

Individuals will be responsible for the design, implementation, test and release of high performance, low cost microprogrammed controllers. In addition to a BS/MSEE, experience must include 2-4 years of computer and digital systems design utilizing high speed TTL logic to develop any or all of the following: Arithmetic unit design, memory management unit design and data communications (bit-oriented protocols).

### Circuit Design Engineers

An immediate need exists for Senior Circuit Design Engineers with the experience and ability to resolve significant analog problems. Must have the experience in designing switching power supplies, high speed BUS, A to D, D to A, converters and modems. Significant experience in worst-case design techniques, computer-aided design, stability analysis and a BS/MSEE degree is a must. Demonstrated ability to supervise other engineers and technicians is desirable.

### Sustaining Engineers

Positions are responsible for sustaining standard hardware products by generating cost improvements and performance enhancements. A BSEE along with a minimum of 2 years experience in sustaining or product design is required, including computer and system design, competence in complex circuit-system design utilizing worst-case design techniques, computer-aided design analysis, and software test equipment troubleshooting techniques.

### SOFTWARE DEVELOPMENT Transaction Teleprocessing

BS Computer Science or related degree and a minimum 3 years experience in any of the following: On-line teleprocessing systems, Data Base management systems recovery, performance analysis/

measurement and/or Data Communications, i.e. bit-oriented communications link protocol (SDLC, UDLC, HDLC). Individuals will have responsibility for any number of development projects.

### Language Design

Openings exist in Data Base and compiler (COBOL) development. Minimum BS Computer Science or equivalent and 4 years experience in (1) the development of Data Base management systems and/or the design of INQUIRY/UPDATE/REPORT systems to a data base and high level language, or (2) the design and development of language processors, especially COBOL.

### Operating Systems

BS/MS Computer Science and a minimum 5 years experience in the design and development of data communications software for operating systems. Specific experience must include ASYNC-BISYNC line and network protocols, (SDLC, UDLC, HDLC). Individuals must have the ability to conceptualize to the extent of pushing the "state-of-the-art".

### Diagnostics

We need professionals with a minimum 5 years experience in assembly language programming, preferably with mini-computers. Individuals will have project responsibility for the development of systems level testing and fault isolation software.

### Software Enhancement

Positions require BS Computer Science or equivalent and a minimum of 2 years experience on mini-computers with primary emphasis in coding of operating transaction systems and/or the identification, resolution and implementation of enhancements to all systems software. Strong background in assembly language programming necessary.

### SYSTEMS PROGRAMMING Applications Development

6-12 years experience in the following areas is required: Evaluation of customer RFQ/RFP packages, proposal preparation for custom software systems, preparation of estimates for the development of custom software packages, design and implementation of applications software packages. Technical expertise is required in communications, distributive processing, data base design, commercial real-time systems, and software development for mini-computers. Language experience should include assembly language on a mini-computer as

well as at least one high level language (FORTRAN/COBOL).

### Data Communications Applications

2-6 years experience in communications with commercial transaction-oriented systems using on-line teleprocessing monitor controlling IBM 3270 or compatible equipment. Mini-computer assembly language programming is required. Individuals will work on the development of a special purpose teleprocessing monitor.

### Message Switch

Challenging positions are available for Senior Programmers with 1-3 years experience with assembly language on mini-computers. Job responsibilities are to learn and maintain our message switch product. Experience in communications/message switching is a plus.

### Specials Diagnostics

We are seeking individuals with 3 or more years of experience in assembly and higher level programming languages (FORTRAN/COBOL). Knowledge of real-time systems programming is required, with experience in data communications and/or diagnostics being highly desirable.

### MANAGEMENT SYSTEMS

#### Business Systems Analysts

Immediate openings exist for individuals with a minimum of 3 years experience in programming and systems analysis for business systems applications. Previous experience is desired in a wide variety of on-line, data-base applications in marketing, manufacturing and finance. Thorough knowledge of COBOL is required, and familiarity with mini-computers is desirable.

### MARKETING SUPPORT

#### Software Application Analysts

Our Headquarters Marketing Support Organization which is involved in customer interface with pre and post sales support, seeks both Junior and Senior level individuals with an appropriate college degree or minimum of 3 years experience as a Systems Programmer or Field Analyst with expertise in the following: Operating Systems, Telecommunications, Data Base Systems design and high level languages. Previous experience involving customer and sales engineering interface desirable.

Please send your resume in confidence to Art Ruben.

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COMPUTER SYSTEMS

MINI-COMPUTER OPERATIONS  
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You're time is now. You've paid your dues and you're ready for the next step. You can be sure that step is in the right direction with Teledyne Brown Engineering. A well established company in Huntsville, Alabama, Teledyne Brown has several openings for experienced data processing professionals.

### PROGRAMMERS

You'll be developing simulation, data reduction, and test control software on large mainframes and minicomputers. A B.S. in Computer Science, Physics, or Engineering and at least five years of programming experience including work in assembly language are prerequisites for success.

### TEST PLANNERS AND DATA ANALYSTS

As testers, you'll plan software tests and analyze resulting test data. A B.S. in Computer Science, Physics, or Engineering and a minimum of three years experience in testing large real-time software packages are musts.

### SYSTEMS ANALYSTS

You'll be analyzing hardware architecture and systems performance, writing high level requirement specifications, and projecting future technology requirements. A minimum of three years in designing processing algorithms and developing or analyzing processor system requirements and technology trends are critical. BS Computer Science, Physics, or Engineering required.

### SYSTEMS SOFTWARE DESIGNERS

This is your chance to enter the stimulating world of computer graphics. Your work will include writing specs, designing, and developing interactive graphics on a mini. You'll also develop a high level simulation language compiler. A BS in Computer Science or Engineering and three years in systems software should back up your creative instincts.

### DP METHODOLOGY DESIGNERS

If you have a knack for software efficiency, this is the spot. As our resident methodology expert, we'll be looking to you for strategies that optimize data processor designs and reduce related time and costs. Primary concentration will be on partitioning techniques for distributed systems, approaches to incremental development, specification languages, coding practices, Science, Physics, or Electrical Engineering, coupled with experience in data processor and software engineering research, we'd like to discuss these opportunities.

Please call our Toll Free number 800-633-2090 Monday through Friday between 8 a.m. and 5 p.m. or submit a resume including salary history to the Personnel Department:

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Employer M/F

**TELEDYNE  
BROWN ENGINEERING**

Cummings Research Park  
Huntsville, Alabama 35807

## Performance Measurement Distributed Systems San Francisco Peninsula

HP's General Systems Division R&D lab seeks a well qualified Computer Scientist/Electrical Engineer with professional interest and experience in the area of computer systems performance measurement as applied to data communications hardware and software products. The successful candidate will be working closely with experienced product development team in the following areas: HP distributed systems networks; HP to IBM communications; terminal intensive systems; communications processors/controllers; and network management products. Prior experience with the techniques and tools useful in performance measurement, analysis and specification in a general purpose multi-programming system environment is a requirement. Interest in communications network analysis is also highly desirable.

If you hold preferably an MS degree in Computer Science or Electrical Engineering, have 2 or more years' experience in the performance measurement environment, and desire to join a R&D team oriented toward technical contribution in the fast growing distributed business systems market place, then HP wants to discuss with you the significant role you can play in our distributed processing product development program. Send your resume in confidence to Hewlett-Packard, General Systems Division, 5303 Stevens Creek Blvd., Santa Clara, California 95050. We are an equal opportunity employer dedicated to affirmative action.

**HEWLETT  PACKARD**

### SYSTEMS ANALYST

The national corporate computing center at a large growing Spokane, Washington multi-industry firm has an immediate opening for a systems analyst. Must have experience in and understanding of total integrated on-line systems concepts, be able to design, direct, and implement such development, and have outstanding communications abilities. In addition, strong accounting and programming background a must. Please send resume, salary history, and salary requirements to:

Personnel Department  
P.O. Box 2727  
Spokane, WA 99220  
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### DATA BASE ADMINISTRATOR

Due to a promotion, Metropolitan Dade County Data Processing is looking for a Unit Administrator for Data Base Administration capable of directing the activities of senior data base analysts and programmers developing data bases for information systems in Criminal Justice, Human Services, Geographic and Physical and Economic applications.

The individual we are seeking must have heavy data base and project management experience working with the user, preferably in a large scale IBM installation operating under OS, SVS, VSI, or MVS in a SYSTEM 2000 environment using CICS.

We offer the challenges and diversity of informational requirements in metropolitan government, the rewards of a career in the public service, the advancement and training opportunities of a rapidly growing organization and competitive salaries up to \$24,412 per annum. Must relocate to Dade County, Florida. Salaries commensurate with experience.

Send resume to: Manuel Garcia  
Metropolitan Dade County  
Data Processing Division  
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Room 908  
Miami, Fla. 33125  
(305) 547-7033  
EOE



## Programmer/Analyst

### Join a leader in the Satellite Communications Industry.

Ford Aerospace & Communications Corporation is in need of a Programmer/Analyst with a thorough knowledge of COBOL and a broad background in business systems analysis and design. The position presents the challenge of breaking ground in new integrated systems development. Experience in manufacturing and material with emphasis on data base management and on-line systems is particularly desirable.

Applicants should have a BS or equivalent and 4 or more years' experience in systems design.

Grow with the industry in a dynamic atmosphere. We offer excellent salaries and fringe benefits including 100% PRE-PAID tuition. For consideration, send resume with salary history/requirements to Professional Staffing, BN-9;

**Ford** **Ford Aerospace &  
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Western Development Laboratories Division  
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## CAREER OPPORTUNITIES IN ADP

### Los Alamos Scientific Laboratory

The University of California's Los Alamos Scientific Laboratory, a multi-faceted national R&D facility, is seeking experienced professionals to work in its Administrative Automatic Data Processing Department, which provides Laboratory wide computer services for administrative and business applications.

### MINICOMPUTER APPLICATIONS SPECIALIST

Will work with administrative minicomputer system, assisting users in software selection, system installation, and system maintenance; and assisting in the development of administrative minicomputer applications. Some work with large-scale machines also required. B.S.-M.S. (preferably in a quantitative discipline) or equivalent experience and exposure to hardware evaluation desired. Two years software design and development experience and a working knowledge of at least two computer languages preferred. The applicant should also display a record of successful professional performance and a capacity for accepting increased responsibility. Good communication skills essential.

### ANALYSTS/PROGRAMMERS

Will design, write, and maintain computer application programs that provide information for Administrative Services. Includes preparation of narrative system proposals, programs, procedures for machine operations, and user documentation. At least three years' experience in COBOL and business systems design required. Preferred qualifications: B.S.-M.S. in information systems, or related field, and experience in Data Base Management Systems (S2K), CDC-6000 series hardware, and minicomputers for business applications.

The Laboratory, located in the beautiful mountains of northern New Mexico, offers excellent working conditions and benefits, such as professional growth opportunities and 24 days' annual vacation. Los Alamos provides a pleasing lifestyle with small-town friendliness, abundant recreational opportunities, and an excellent school system.

Send complete resume, in confidence to:  
Patricia D. Beck, Recruiting Representative  
Division - 77-AO  
Los Alamos Scientific Laboratory  
P.O. Box 1663  
Los Alamos, New Mexico 87545



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CIRCULATION DEPARTMENT



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## COMPUTER SYSTEM HARDWARE INSTRUCTORS

Career opportunities exist with Harris Corporation. Our fast growing division, the Computer Systems Division, situated in Fort Lauderdale, Florida has the above instructor positions immediately available.

The individuals we seek will have responsibilities in the development, documentation and presentation of computer system hardware courses. Participation in training media and methodology for development of new courses are required.

We prefer experienced hardware instructors having a minimum of 4 years class exposure in microprocessors and communications. These positions lead directly toward careers in-house or toward other marketing divisional and field related responsibilities.

Send your resume in complete confidence to J.D. Jones, Harris Corporation, Computer Systems Division, 1200 Gateway Drive, Ft. Lauderdale, Florida 33309.



**HARRIS**  
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## ANALYSTS PROGRAMMERS

All fees paid. No contract or application required.

Positions nationwide, especially Southeast. This is partial list, many others available.

**SR. SYS. ANAL.** To \$25K  
Program leader in accounting related to IBM environment.

**SYS ANALYST** To \$20K  
CICS experience-several openings.

**ANAL. & PROGS** To \$25K  
Casualty insurance experience-several openings.

**ANALYST/PROGS** To \$20K  
Credit card experience, project leaders & other openings.

**EDP AUDIT** To \$23K  
Several openings, some prefer accounting/CPA experience, some heavy DP.

**SR. ANALYST** To \$20K  
Manufacturing environment, DBOMP, MRP desirable.

**MINICOMPUTER NETWORK ANALYST** To \$25K  
Establish mini network, define standards.

**ON-LINE ANALYST** To \$25K  
Manufacturing environment, mini, CICS, or other major on-line experience a plus.

Current employment will be protected. Send resumes, including present and desired salary and relocation preferences to: JIM STAAL, Mgr. Information Systems Division.

*Whitlow & Associates*

1380 Peachtree Rd. NE Suite 438  
Atlanta, Georgia 30326

Telephone 404/262-2566

## Senior System Firmware Design Engineer

Amdahl has a lot to offer good people ready to take a positive step toward upgrading their careers and work environment. You will find the enthusiasm, excitement, and friendliness contagious. You might even find your work being fun, as most of us do.

Qualified candidates should have IBM O/S internals experience (MVS and VM preferred) and/or firmware design and development experience, or hardware development experience. Requirements include an MS in Computer Science or an EE and 5 years' experience. Please direct your response to Employment Manager, Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086. We are, of course, an equal opportunity employer.

**amdahl**

## Computer Marketing Professionals...

# Digital's Laboratory Data Products Group Means Exceptional Opportunities For You!

One of the major product line groups within Digital Equipment Corporation, Laboratory Data Products, is responsible for developing and marketing products for systems applications use in direct and experimental research. Our markets are located in all segments of the medical and research community, including the Federal government, universities, and private researchers.

Three exceptional opportunities are now available, all offering broad corporate exposure and potential for increased responsibility and growth, and a chance to broaden your professional perspective by working in a dynamic environment with a group of diversely talented individuals.

### Industrial Research & Development Marketing

This high-visibility position requires an aggressive self-motivated individual who can handle a new marketing responsibility for the industrial R&D markets, one of the newest and fastest-growing application areas for minicomputer systems.

You should be capable of investigating, identifying, and developing plans and strategies for increased market penetration including penetration of the international marketplace. Working with a significant amount of independence, you'll also support the sales force when requested, including field presentations. Obviously, excellent interpersonal skills are essential.

A technical degree or equivalent with at least 2 years thorough exposure to industrial market research, preferably in engineering or chemistry, and a solid familiarity with minicomputers are required. Sales and/or marketing experience is a definite asset.

### Federal Government Marketing

If you have experience in direct sales or marketing to government agencies, this newly created opening is an excellent opportunity to utilize it.

Your primary responsibility will be to provide the marketing emphasis necessary to increase marketplace penetration in scientific systems sales to the Federal government, one of our largest marketplaces. Duties will also include preparing short and long term marketing plans, representing the group on corporate committees and in meetings with our Federal National Sales Group, and providing support to the sales force as needed.

We require successful experience in government scientific sales and/or marketing, preferably in minicomputer systems. An engineering or scientific degree or equivalent is also necessary for this growth and advancement opportunity.

### Minisystems Marketing

We're seeking a professional who combines technical knowledge with business acumen to help run the minicomputers marketing group within Laboratory Data Products. You'll be involved in the daily business decisions as well as the development of strategies for short and long term product development, and will have an excellent opportunity to grow into managerial responsibilities.

Other duties will include sales support, short and long term forecasting, new product development studies, and competitive analyses.

You must have 3-5 years experience selling or marketing minicomputers, preferably to the scientific marketplace, and a technical degree or equivalent. An MBA is preferred.

These positions are based in Digital's Marlboro, Massachusetts facility, a 40 minute drive from Boston.

Marlboro and its surrounding communities offer you and your family an attractive residential lifestyle and convenient to the unsurpassed cultural, educational and recreational resources of the New England area.

If you are interested and qualified in these positions, please forward your resume **COMPLETE WITH SALARY HISTORY** to Douglas D'Agata, Digital Equipment Corporation, 200 Forest Street, Marlboro, Mass. 01752.

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## SOFTWARE MARKETING OPPORTUNITIES

Value Computing Inc., a proven leader in the development and marketing of D.P. Operations Software Systems, is expanding its marketing force in the San Francisco, Chicago, and East Coast areas. Two types of positions are available now to the aggressive, self-motivated D.P. professional.

### MARKETING REPRESENTATIVE

- DOS/VS Application or Systems Programming experience required.
- No sales experience necessary.
- Large client base and extensive prospect list.

### BRANCH MANAGER (S.F., Chicago, & East Coast)

- Proven D.P. sales experience required
  - Moderate travel within territory
  - Knowledge of D.P. Operations desirable.
- We are seeking ambitious individuals who will be well compensated for performance (Salary + Commission + Expenses + Bonus). Advancement potential in our dynamic company is excellent. Knowledge of IBM hardware is desirable. Don't pass up this opportunity to maximize your income. Please immediately send your detailed resume including salary history in complete confidence to: Carl Dreyer, Value Computing Inc., 4415 W. Harrison, Hillside, Ill. 60162 (312) 449-2200.

Educational agency needs three temporary interns to work in data processing office, familiar with OS, JCL, program skills COBOL, ANSI; preferably with one year of experience in IBM Systems 360/370-OS/MFT environment. Submit letter and resume by August 29, 1977 to: Department of Higher Education, 225 West State Street, Trenton, N.J. 08625. Attention Personnel Office. An Equal Opportunity/Affirmative Action Employer

### VIRGINIA-MARYLAND

Proj. Leader (2) to \$24M  
Sys. Analyst (2) to \$20M  
Programmer/Anal (3) to \$19M  
Lead Prog. (1) to \$18M  
Programmer (4) to \$16M

We are currently staffing 4 major corps in Virginia, Maryland & Southern PA. Clients seek exp with large scale IBM OS with COBOL and/or ALC. Background in mfg, banking, or insurance appropriate. Relocation & all fees paid by client cos. Contact in conf. G. Nugent, EDP Specialist, (301) 296-4500.

FOX-MORRIS  
PERSONNEL  
CONSULTANTS  
409 Washington Ave.  
Baltimore, MD 21204

### SR. PROGRAMMER/ ANALYST

Position available with a major hospital system in the Baltimore-Washington area. Prefer 5 yr. exp., IBM 370, CICS & COBOL. Exp. at a medical institution highly desirable. Applicants may choose day or midnight shift. Send resume with salary history to Employment Manager.

Prince George's  
General Hospital  
& Medical Center  
Cheverly, MD 20785  
EOE

### Full time faculty position in Computer Science

available beginning in January, 1978. Faculty rank; salary: DOE/QUALS. Duties include undergraduate instruction in systems programming, computer architecture and business systems analysis as well as curriculum development. Minimum educational requirement is a Master's degree in Computer Science or equivalent. Industrial experience preferred. Please send resume (including references) by November 15, 1977 to: Robert S. Shaak, Chairperson, Department of Mathematics and Computer Science, Millersville State College, Millersville, Pennsylvania 17551. Millersville State College is an EO/AAE.

### POSITIONS AVAILABLE NATIONWIDE

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Group Systems Specialist 15K  
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Seattle, WA 98111  
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### COMPUTER PROGRAMMING INSTRUCTOR FOR VOCATIONAL-TECHNICAL SCHOOL

Must have teaching knowledge in COBOL, RPG II, and DOS/VS Assembler languages. Instruction is designed to teach entry-level skills for business application computer programmers and operators. IBM 370/125 DOS/VS computer system available for training. Nine-month program with possible additional employment available during the summer. B.S. degree in Business Education is desirable. Salary commensurate with experience.

Contact:  
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Unified School District 501  
Topeka Public Schools  
415 West Eighth  
Topeka, Kansas 66603  
(233-0313 Ext. 176  
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## SOFTWARE DESIGNERS AND SYSTEMS ENGINEERS FOR TRANSACTION PROCESSING

Transaction Technology, Inc. (TTI), a subsidiary of Citicorp, is dedicated to the design and development of electronic banking products, and specifically, Electronic Funds Transfer Systems. Our continued advancement and achievement is due to a strong recognition of the need for high technology, and the commitment to a staff of talented individuals who make it all happen.

We are currently seeking qualified individuals with extensive background in on-line real time systems, experience with large data bases and knowledge of communication networks for the following areas:

**SYSTEMS ENGINEERING:** Minimum of 3 years experience in the hardware/software development of interactive systems, data base management and/or associated communications systems. Responsibilities will include planning, architecture and design of a new transaction processing network. Seeking individuals with experience in:

- Operating systems for time sharing and real time processing.
- Distributed data base processing and integrated data bases.
- Applications processing.
- Communication subsystems for switching, concentration, network and terminal control.
- Dial-up, private and public data network offerings.
- Intelligent terminals.

**DIAGNOSTIC SOFTWARE:** Hands-on hardware experience in mini-computers and ability to read logic diagrams. Background in large rotating memories and microprocessors is a plus.

**COMMUNICATIONS SOFTWARE:** Sound background in interactive network information systems, communications protocols and message switching. A working knowledge of dial-up private and public data networks is required.

**SYSTEMS SOFTWARE:** Minimum of 3 years experience in one of the following areas:

- Operating Systems: Background with interactive real time, large data base systems; task scheduling; reentrant code and error diagnostics.
- Data Base Management: Working knowledge of sophisticated access routines and file recovery techniques for large data bases.
- System Performance: Experience in system performance analysis and reliability.

**MICROPROCESSOR SOFTWARE:** Experience in the design of micro-processing firmware applications or diagnostics using the Intel 8080 for network terminals.

**SYSTEMS ANALYSTS/APPLICATIONS SOFTWARE:** Ability to design and develop software for banking and retail service applications. Background in financial/banking credit authorization systems a definite plus.

**QUALITY ASSURANCE:** Knowledge of data center operations and experience with system testing, integration and verification. Applicants should also have background in software maintenance and support.

TTI offers an exceptional salary and benefits program which includes a comprehensive group insurance program, pension plan and education assistance to name just a few. We are surrounded by beautiful suburban communities, just minutes from beaches, mountains, deserts, various cultural centers and, of course, Disneyland.

With TTI, you can have the best of both worlds... the rewards of a stimulating work environment coupled with the joys of Southern California living! If you thrive on challenge, are committed to quality, and want to work in an environment where your ideas are respected, let's discuss your future and ours. Send your resume, including salary history, in complete confidence to:

LORRAINE WATSON, PERSONNEL MANAGER  
**TRANSACTION TECHNOLOGY, INC.**  
10880 WILSHIRE BLVD.  
LOS ANGELES, CA. 90024

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## EDP CONTROLS ANALYST

### NYC LOCATION

We seek an individual with a primary background in systems development to join our EDP controls staff. Selected candidates will be well versed in all phases of systems development projects and have good oral and written communication skills.

Functional responsibilities include: review of EDP controls, systems integrity, documentation standards, etc. during the design and implementation phases.

Any exposure to EDP auditing and/or programming are definite pluses.

Salary commensurate with experience as well as comprehensive benefits plan.

Kindly send resume and salary history to:  
MANAGER OF TECHNICAL RECRUITING  
CW Box 5132, 797 Washington St., Newton, MA 02160

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# SYSTEMS PROGRAMMER

Our Corporate Data Processing Center, located in Fullerton, California, has immediate openings for Systems Programmers to become actively involved in converting our present system software to a new virtual system software in order to exploit the power of our recently acquired Amdahl 470V/6 computer. In addition, we are in the planning stage for installation of a data network capable of switching remote users to any of the several host systems located throughout Hughes Aircraft Company.

Positions exist for experienced persons in the following areas of expertise:

- On-Line Systems Programmers with experience on at least one of the following IBM Subsystems: ATS, IMS, System 2000 or TSO.
- Operating Systems Programmers/Analysts with experience in installation and support of the IBM MVS operating system. In particular JES 2/JES 3 or systems measurement and performance tuning.
- System Planners with experience in evaluation and selection of data processing equipment in the areas of: DASD Storage, Tape Storage, Mass Storage, Intelligent Terminals.

Applicants should have demonstrated ability to formalize evaluations and present alternatives to management.

Positions exist at all experience levels. Candidate selection will depend on experience, capability, and self-motivation.

Qualified applicants should send their resumes to: Professional Employment, Department N-1, Ground Systems Group, P.O. Box 3310, Fullerton, CA 92634.

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## EDP PROFESSIONALS San Francisco/Bay Area

If you are a: PROGRAMMER, SYSTEMS ANALYST, SYSTEMS PROGRAMMER or EDP MANAGER with a minimum of 2 years experience with commercial, financial, manufacturing, scientific systems; we would like to talk with you about career opportunities available in the San Francisco Bay Area.

### PERSONAL LOCAL INTERVIEWS

will be conducted the week of Aug. 14th-19th in Boston. For an appointment or more information, please call Mr. Bernie Bernstein, at (617) 426-2000, Sunday thru Friday.

or write:

#### LOGICAL OPTIONS INC.

233 SANSOME ST. SUITE 1300  
SAN FRANCISCO, CA. 94104  
415/781-0844

### SYSTEMS PROGRAMMER To \$21,788

We are seeking a "Self Starter", who has the ability to present technical ideas in a form suitable for Management Decision Making. This is a position which offers a high potential for professional growth and management recognition.

#### MINIMUM QUALIFICATIONS:

- Two years systems programming experience on IBM equipment (OS preferred), performing sysgens, applying fixes, maintenance and solving application programming problems.
- High degree of proficiency in BAL.

#### EXPERIENCE IN THE FOLLOWING IS A PLUS:

- OS to VS conversion
- Performance measurement
- Time accounting systems
- HASP
- Standards definition

If you meet the above qualifications and wish to increase your level of responsibility and financial rewards, please send your resume or call:

The Omaha National Bank, 17th & Farnham Sts., Omaha, Neb. 68102, George T. Plofkin, Mgr. of Technical Planning & Support, (402) 348-6107. EOE.

## PROGRAM MANAGER Software Leader

Join our Corporate Retail Program Management team and apply your expertise in program management.

You will be a generalist who is knowledgeable in basic and applied software, including OS usage, compilers, peripherals, communications, and industry standards.

You will be involved with product planning, business strategies and design reviews.

If you have the above experience plus a BS in CS/Business or equivalent educational qualifications, send your resume to:

# NCR

Mr. Vernon L. Mirre  
Corporate Executive &  
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## Microprocessor Programmers

MSI Data, the acknowledged leader in the manufacture and supply of state of the art applications terminals has immediate openings for Microprocessor Programmers.

In order to develop and support MSI terminal systems software, background should include 4-6 years' assembly language programming on mini's or micro's along with extensive exposure in data communications. Knowledge of RAM ROM and EPROM is required. Ability to write concise software specifications and documentation is a prerequisite for consideration.

We offer comprehensive compensation, maximum career opportunities and the support of an organization marked by its professionalism. Send resume or call Vern Wiersma at (714) 549-6126.

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# Engineers

## Houston Openings

Texas Instruments, Digital Systems Division, has challenging career opportunities in Houston for innovative engineers. The assignments will be in design and development of revolutionary data terminal and peripheral equipment, using advanced technologies.

### Digital Design Engineer

Project responsibility from conception to production. Perform system architecture design, logic/interface design and engineering support of microprocessor-based systems. Will involve design of peripheral controllers memory system design and I/O system design and related software. Requires a BS/MS in EE with 1-3 years' microprocessor design experience desirable.

### Analog Design Engineer

Opportunity in the design, development and engineering support of electrical equipment. Design of cost effective switching power supplies utilizing advanced power control devices and high speed special purpose, electro-mechanical device drivers. Requires a BS/MS in EE with 1-3 years' analog design experience desirable.

### Mechanical Design Engineer

Responsible for mechanical design, packaging concept and engineering support of electromechanical component and terminal/peripheral equipment. Will make mechanical layouts, dynamic system modeling and analyses. Requires a BS/MS in ME with 1-3 years' electromechanical component design desirable. Knowledge of plastics design for volume production also desirable.

If you qualify, send your resume in complete confidence to:  
Staffing Manager/P. O. Box 1443, M.S. 605/Houston, Texas 77001.

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## SYSTEMS PROGRAMMER

The Computer Services Division of American Management Systems, Inc., has an immediate opening for a Senior Level Systems Programmer in its Arlington, Virginia Computer Center. The Center presently has two loosely coupled IBM mainframes running under OS/HASP. Customers use the AMS Center via HASP/RJE, WYLBUR and CICS.

The individual sought must be a self-starter and possess the ability to help plan and implement a transition from OS to MVS as project leader.

Persons applying for this challenging position must satisfy the following requirements:

- Actual system software experience in an IBM VS environment
- Demonstrated ability to provide guidance in the areas of CPM (Computer Performance Measurement)
- Functional knowledge of teleprocessing monitors and access methods.

### Desirable:

- Previous TSO and/or WYLBUR experience
- OS/MVT/HASP background
- MVS/JES2

Salary commensurate with experience. Excellent vacation, other fringe benefits.

Please send resume and salary history in confidence to:

Thomas E. Martin  
Vice President

AMERICAN MANAGEMENT SYSTEMS, INC.  
1901 North Moore St.  
Arlington, VA 22209



**AMERICAN MANAGEMENT SYSTEMS, INC.**

AMERICAN MANAGEMENT SYSTEMS INC.

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## SYSTEMS ANALYSTS

We are a rapidly expanding national real estate development and management company, seeking qualified systems analysts. We are currently running a Digital PDP-11/70 using RSTS-E. All applicants should have a minimum of four years of D.P. experience primarily in the design and implementation of data management and financial systems. Experience with RSTS-E and data communications is desirable. Salary is commensurate with experience. Please send resume and salary requirements to:

**MELVIN SIMON & ASSOCIATES, INC.**  
Data Processing Dept.  
P.O. Box 44230  
Indianapolis, Ind. 46244  
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## TECHNICAL SUPPORT SUPERVISOR

Beautiful West Coast Florida Location  
(\$17,400-\$26,800)

Innovative D.P. shop seeks senior level systems programmer to lead Technical Support Section. This highly challenging position involves all phases of systems including performance evaluation, B.S. and three years of related systems experience is required with IBM 370 DOS/VS and CICS is highly desirable. Excellent fringe benefits including over time. Application/resume accepted until 8/26. Send to: Unified Personnel System, Pinellas County Government, 315 Haven St., Clearwater, Fla. 33516.

## DATA PROCESSING MANAGER

St. Louis Community College has an opening for a Computer Center Manager. Qualified applicants must have a bachelor's degree in the appropriate discipline with 4 years experience required including business and scientific programming, systems development, equipment evaluation, computer operations management and DOS operating systems. Excellent salary and fringe benefits. Interested persons should submit resume to: Lawrence J. Wolf, Associate Dean of Instruction

St. Louis Community College  
at Florissant Valley  
3400 Pershall Road  
St. Louis, MO 63135

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## COMPUTER PROGRAMMER

Immediate opening - position requires original programming and program maintenance for an ongoing complex system of Library applications in both teleprocessing and batch environments. Library cataloging, circulation and processing of textual information is involved. Must be a graduate of a recognized data processing or computer science program and be competent in Cobol and PL/I. Experience in IBM 360 or 370 Assembler Language highly desirable.

For confidential attention, please send resume to:

Director of Personnel  
Western Kentucky University  
Bowling Green, KY 42101  
Equal Opportunity Employer

## FLORIDA

Several openings with var exp 370/DOS VS with or without CICS-Cbl or BAL-mfg or fincl appl prog or Sys Prog. These positions are open now. Mail your resume today! 12-10K ALL FEES PAID. Many other openings from \$12,000-\$25,000. Mail Your Resume Today.

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## SOFTWARE

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We are a dynamic and fast growing systems house specializing in RSTS/E Systems. We have offices open or planned for Orange County, Santa Clara, Portland, Salt Lake City, and Denver. If you have top qualifications, we can offer you a challenging position with superior opportunities for growth and advancement.

- BUSINESS APPLICATIONS SPECIALIST (Orange County)
- PROGRAMMER/ANALYST (Orange County)
- SENIOR BUSINESS ANALYST (Santa Clara)

Send resume in strict confidence to Software Manager.



Data Processing Design, Inc.  
6980 Aragon Suite 7  
Buena Park, CA. 90620  
(714) 994-4971

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Our recently organized EDP department is looking for candidates who desire entry into a new and rapidly expanding Multi Disciplinary Profession.

Duties to include audit of performance of functional EDP activities including pre-implementation audits for proposed and in-development application programs & systems.

Positions provide opportunity to work in a dynamic environment with top EDP and Auditing professionals on diversified assignments, offering high visibility and an excellent career path leading to Managerial responsibility.

Qualifications include, but are not limited to:

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- GOOD COMMUNICATIVE AND ADMINISTRATIVE SKILLS.

(If you have these skills and are already an EDP AUDITOR we would also like to talk with YOU!)

Current configuration: IBM 370/168, OS/MVS, TOTAL DBMS, TCAM, TSO and HONEYWELL H8200-OS200.

Company offers attractive starting salaries at all levels as well as comprehensive benefits, tuition refund plan, and specialized courses in an in-house technical education center.

Please submit resume in strict confidence. Residents outside the New York City area are invited to call us collect:

Mr. Robert Gill 212-490-5138



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# DRC

## Grow with us!

Dynamics Research Corporation is a firmly established and diversified organization engaged in a wide range of government and industrial markets. We are located in suburban Wilmington, Massachusetts, not far from the New Hampshire border and within easy commuting distance of metropolitan Cambridge and Boston.

### Manager Government Programs (Information Systems)

You will be interfacing with Federal Government customers on ongoing projects and participating in the marketing efforts in the areas of new projects and new customer development. You will also participate in the evaluation of hardware and software solutions to data processing problems. Other responsibilities include controlling projects with regard to cost, schedule and deliveries.

A Bachelors degree or equivalent with a strong background in computer software development including 3 or more years in project management or alternately 5 or more years of strong project management experience in a related technical area is required.

### Communications Specialist

We have an immediate need for an individual to support our data communications software and hardware. You will be responsible for the communications on a Honeywell-6000/DN355 and a Honeywell G-437/DN30. You should have at least 2 years' experience with GRTS software and solid knowledge of modems, multiplexors and other communications hardware.

### Information Systems Programmer/Analyst

Assists the Program Manager in the analysis and design of information systems. Performs program module specifications, diagraming, coding, testing and documentation from the system specifications.

Requires BA or BS degree with 2-4 years' experience in systems analysis and programming for business and data base applications.

### Information Systems Programmer

Assists in the preparation of program module specifications. Diagrams, codes, tests and debugs the program module. Occasionally interfaces on technical problems with clients.

Requires BS or BA degree plus 1-3 years' experience in business applications and (cobol) data access methods. H-6000 or G-400 experience desirable but not necessary.

Interested qualified candidates should forward a resume complete with salary history to Mr. Jack Kelly, at the address below.

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United Nuclear Corporation has an opening for Systems Analyst. This position requires 2 to 5 years experience in systems, including business applications.

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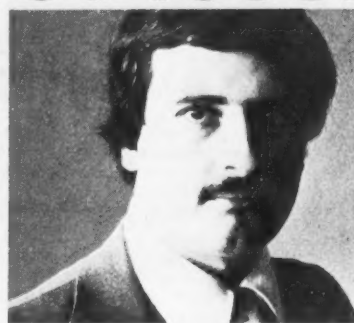
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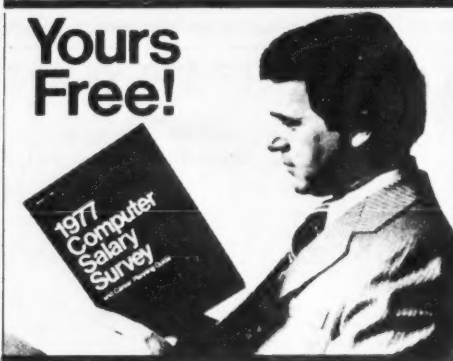
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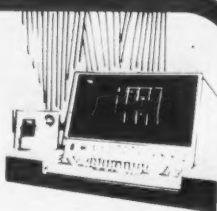
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Pierce County

Personnel Department

Room B-44

County-City Building

Tacoma, WA 98402

(206) 593-4460

Closing Date:

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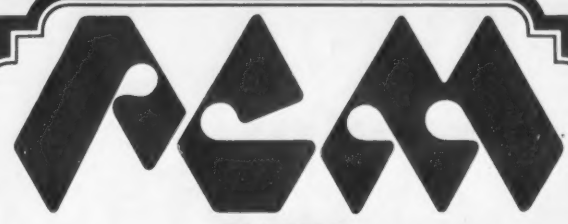
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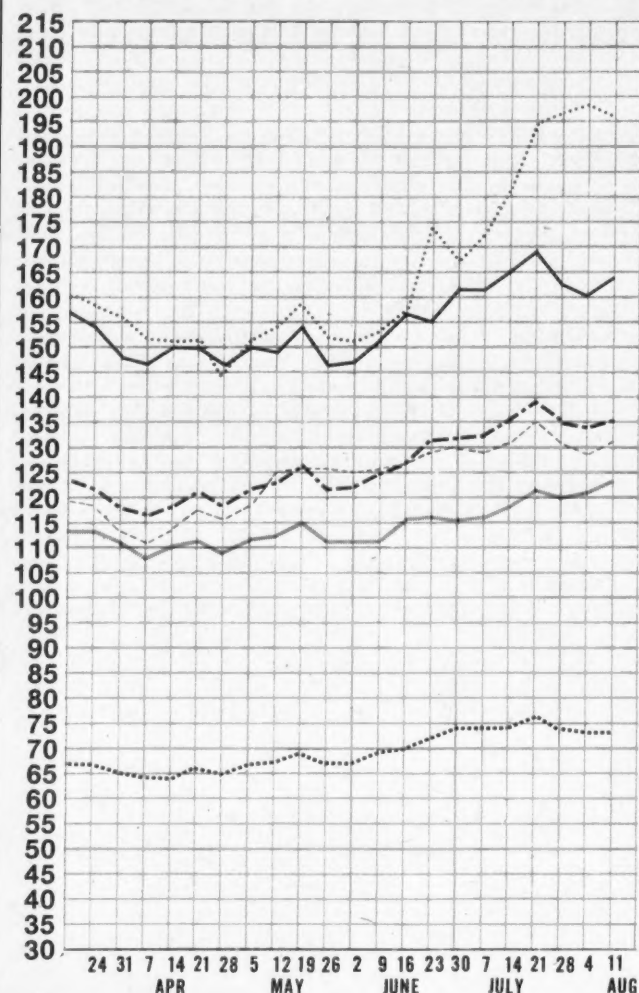
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Revenue	62,759,000	28,430,000
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3 Mo Shr	.02	(.39)
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### MEGADATA

	1977	1976
Shr Ernd	\$ .07	\$ .15
Revenue	3,366,924	2,816,067
Earnings	86,579	115,248

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	1977	1976
Shr Ernd	\$ .06	\$ .08
Revenue	6,145,600	4,611,800
Earnings	189,100	243,200
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Revenue	15,737,000	14,854,000
Earnings	250,800	700,400

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	1977	1976
Shr Ernd	\$ .29	\$ .31
Revenue	2,952,000	2,009,000
Earnings	254,000	212,000
6 Mo Shr	.53	.51
Revenue	5,243,000	3,553,000
Earnings	460,000	337,000

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	1977	1976
Revenue	\$695,407	\$619,551
Loss	174,257	59,710
6 Mo Revenue	1,537,797	1,101,245
Loss	128,884	228,884

### PLESSEY

	1977	1976
Shr Ernd	\$ .81	\$1.72
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Earnings	18,900,000	34,000,000

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 Roy Einreinhofer  
**Advertising Administrator**  
 Terry Williams  
 COMPUTERWORLD  
 797 Washington Street  
 Newton, Mass. 02160  
 Phone: (617) 965-5800  
 Telex: USA-92-2529

**Boston**  
 Robert Ziegel  
**Northern Regional Manager**  
 Mike Burman  
**Account Manager**  
 COMPUTERWORLD  
 797 Washington Street  
 Newton, Mass. 02160  
 Phone: (617) 965-5800

**New York**  
 Donald E. Fagan  
**Eastern Regional Manager**  
 Frank Gallo  
**Account Manager**  
 COMPUTERWORLD  
 2125 Center Avenue  
 Fort Lee, N.J. 07024  
 Phone: (201) 461-2575

**San Francisco**  
 Bill Healey  
**Western Regional Manager**  
 Jim Richardson  
**Account Manager**  
 Donna Dezelan  
**Account Coordinator**  
 COMPUTERWORLD  
 1212 Hearst Building  
 San Francisco, Calif. 94103  
 Phone: (415) 495-0990

**Los Angeles**  
 Bill Healey  
**Western Regional Manager**  
 Jim Richardson  
**Account Manager**  
 Judy Milford  
**Account Coordinator**  
 COMPUTERWORLD  
 1434 Westwood Boulevard  
 Los Angeles, Calif. 90024  
 Phone: (213) 475-8486

**Japan**  
 Mr. Shigema Takahashi  
**General Manager**  
 DEMPA/COMPUTERWORLD  
 1-11-15 Higashi Gotanda  
 Shinagawa-ku, Tokyo 141  
 Phone: (03) 445-6101  
 Telex: J2424461

**United Kingdom**  
 Tony Vickers  
**COMPUTERWORLD PUBLISHING LTD.**  
 140-146 Camden Street  
 London NW1 9PF  
 England  
 Phone: (01) 485-2248  
 Telex: UK-26-47-37

**West Germany**  
 Hans-Jürgen Ballnath  
**COMPUTERWORLD GmbH**  
 8000 Munich 40  
 Tristramstrasse 11  
 West Germany  
 Phone: (089) 36-40-36  
 Telex: W.Ger-5-215250-HKFD

## Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, AUGUST 10, 1977

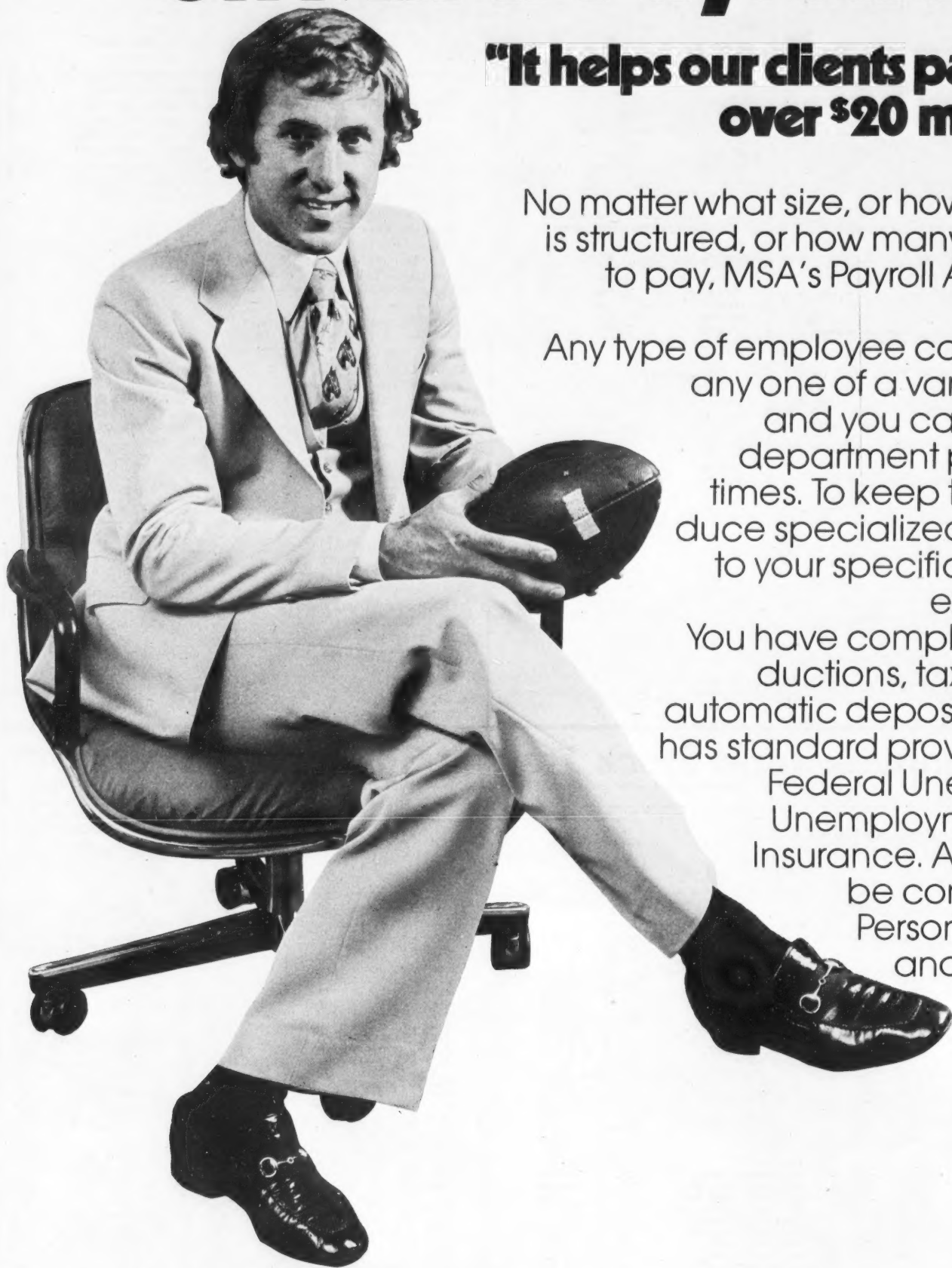
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EXCH C H	PRICE					EXCH C H	PRICE					EXCH C H	PRICE														
	1977 RANGE (1)	CLOSE AUG 10 1977	WEEK NET CHNGE	WEEK PCT CHNGE	1977 RANGE (1)		CLOSE AUG 10 1977	WEEK NET CHNGE	WEEK PCT CHNGE	1977 RANGE (1)	CLOSE AUG 10 1977		WEEK NET CHNGE	WEEK PCT CHNGE													
COMPUTER SYSTEMS														SOFTWARE & EDP SERVICES													
J	AMDAHL CORP	0-39	34	+3 1/2	+11.4	O	ADVANCED COMP TECH	1-2	1	+1/8	+14.2	O	DATA ACCESS SYSTEMS	4-5	3 3/4	0	0.0										
N	BUPROUGHS CORP	55-91	71 7/8	+5 1/8	+7.6	O	ANACOMP INC	7-10	8 1/2	-3/4	-8.1	O	DATA 100	6-9	7 1/4	-1/8	-1.6										
N	COMPUTER AUTOMATION	18-28	27 3/4	+1 1/2	+5.7	A	APPLIED DATA RES.	5-10	8 1/2	-1/8	-1.4	A	DATA PRDCLTS CORP	9-15	14 1/4	+1/4	+1.7										
N	CONTROL DATA CORP	20-26	21	+3/8	+1.8	N	AUTOMATIC DATA PROC	23-30	28 1/2	+1 1/8	+4.1	C	DATA TECHNOLOGY	3-4	4	0	0.0										
N	DATA GENERAL CORP	35-50	48 3/8	+2	+4.3	O	COLEMAN AMERICAN COS	2-2	2	0	0.0	C	DATLM INC	1-2	1 5/8	-1/8	-7.1										
N	DATAPoint CORP	18-30	27	+3/4	+2.8	O	COMPU-SERV NETWORK	10-15	10	0	0.0	O	DECISION DATA COMPUT	2-3	2	-1/4	-11.1										
N	DIGITAL EQUIPMENT	37-53	48 1/4	+7/8	+1.8	O	CCMF ELECTION SYSTEMS	6-10	9 3/8	0	0.0	O	DELTA DATA SYSTEMS	1-1	3/8	0	0.0										
N	ELECTRONIC ASSOC.	2-3	1 7/8	-1/8	-6.2	O	COMPUTER HORIZONS	1-1	1 1/4	0	0.0	N	ELECTRONIC M & M	4-5	3 5/8	0	0.0										
A	ELECTRONIC ENGINEER.	8-10	8 1/2	-1/8	-1.4	O	COMPUTER NETWORK	6-8	8 3/8	+1 3/8	+19.6	C	FABRI-TEK	1-2	1	0	+6.2										
O	FOUR-PHASE SYSTEMS	13-17	14 7/8	+1	+7.2	N	COMPUTER SCIENCES	7-9	8 7/8	+7/8	+10.9	O	GENERAL COMPUTER SYS	0-2	1 1/8	0	0.0										
N	FCB MICRO	42-54	47 3/8	-1/4	-0.5	O	COMPUTER TASK GROUP	1-2	1 1/4	0	0.0	N	HAZELTINE CORP	9-12	8 7/8	-1/4	-2.7										
O	GENERAL AUTOMATION	6-9	6 3/4	0	0.0	O	COMPUTER USAGE	1-3	1 1/2	0	0.0	N	HARRIS CORP	28-39	35 3/8	+2	+5.9										
O	GRI COMPUTER CORP	1-1	1	0	0.0	O	COMSHARE	5-7	6	0	0.0	A	INCCERT CORP	10-15	10 3/8	-1/8	-1.1										
N	HEWLETT-PACKARD CO	69-87	82 1/2	+3 3/4	+4.7	O	CODATA DIMENSIONS INC	3-5	3 1/8	0	0.0	O	INFEX INC	4-7	4 1/2	0	0.0										
N	HONEYWELL INC	44-55	51 5/8	+1/8	+0.2	O	DATATAB	1-2	1 3/4	-1/8	-6.6	O	INFORMATION INTL INC	9-14	10	+1/4	+2.5										
N	IBM	245-286	268 1/4	-1 1/2	-0.5	N	ELECTRONIC DATA SYS.	16-20	17 7/8	+1/8	+0.7	C	INTEL CORP	38-57	49 1/2	+1	+2.0										
O	MANAGEMENT ASSIST	5-9	6 7/8	+3/8	+5.7	O	INSYTE CORP	2-3	1 3/4	0	0.0	A	LUNDY ELECTRONICS	3-6	4 1/4	-5/8	-12.8										
O	MEMCREX	23-29	26 1/2	+1	+3.9	O	IPS COMPUTER MARKET.	1-2	1 5/8	+1/8	+8.3	O	MSI DATA CORP	6-10	10 1/8	+1/2	+5.1										
O	MICRODATA CORP	7-18	10 3/8	+3/8	+3.7	O	KEANE ASSOCIATES	3-4	3 3/4	-5/8	-14.2	N	MOHAWK DATA SCI	5-8	6	+1/4	+4.3										
O	MODULAR COMPUTER SYS	5-8	7	-1/8	-1.7	O	KEYDATA CORP	2-3	1 5/8	-1/8	-7.1	O	PENRIL CORP	2-5	4	0	0.0										
N	NGR	32-46	45 1/4	+1 1/4	+2.8	A	LOGICON	7-17	12 1/4	-3/8	-2.9	A	PERTEC CORP	7-9	7 1/2	0	0.0										
O	PRIME COMPUTER INC	12-18	17 3/4	+1 1/2	+9.2	A	MANAGEMENT DATA	1-2	1 3/4	+1/8	+7.6	A	POTTER INSTRUMENT	2-2	1 3/4	0	0.0										
N	PERKIN-ELMER	17-22	20	+1/2	+2.5	A	NATIONAL CSS INC	19-25	22 1/4	0	0.0	O	PRECISION INST.	2-2	1 1/2	0	0.0										
N	RAYTHEON CO	16-33	29 3/4	-1/8	-0.4	O	NATIONAL DATA CORP	4-7	5 3/4	+1/8	+2.2	C	QUANTOR CORP	4-5	4	0	0.0										
N	SPIRERY RAND	34-42	35 3/4	+1/2	+1.4	A	ON LINE SYSTEMS INC	17-22	18 1/8	+7/8	+5.0	O	RECOGNITION EQUIP	6-10	8 3/8	-1/8	-1.4										
O	SYCOR INC	8-15	9 3/4	-3/8	-3.7	N	PLANNING RESEARCH	3-6	5 1/8	0	0.0	O	SCAN DATA	1-2	1 1/2	0	0.0										
A	SYSTEMS ENG. LABS	5-8	7 1/4	+1/4	+3.5	O	PROGRAMMING & SYS	1-1	1 1/2	0	0.0	O	STORAGE TECHNOLOGY	10-15	14 3/4	+1 3/8	+10.2										
N	VARIAN ASSOCIATES	15-21	17 1/4	-1/2	-2.8	O	RAPIDATA INC	2-3	2 7/8	+5/8	+27.7	O	T BAR INC	7-12	12 3/8	+7/8	+7.6										
A	WANG LABS.	10-21	11 3/4	+1/4	+2.1	O	REYNOLDS & REYNOLD	17-20	18 1/4	+1/4	+1.3	O	TALLY CORP.	4-6	3 3/4	+1/4	+7.1										
LEASING COMPANIES														SCIENTIFIC COMPUTERS													
O	BOOTH COURIER CORP	8-10	10	-1/8	-1.2	O	TYMSHARE INC	14-23	21 3/8	+7/8	+4.2	N	TELECNIX INC	29-37	36 1/8	+2 1/4	+6.6										
O	CCDISCO INC	10-13	11	0	0.0	A	URS SYSTEMS	4-5	4 3/8	+1/8	+2.9	N	TELEX	2-3	2 3/4	0	0.0										
A	COMMERCE GROUP CORP	2-2	1 7/8	+1/8	+7.1	N	WYLY CORP	1-2	1 1/4	-1/8	-9.0	C	WILTEK INC	1-1	7/8	+1/8	+16.6										
A	COMPUTER INVSTRS GRP	1-2	1 7/8	0	0.0	PERIPHERALS & SUBSYSTEMS																					
N	DATRONIC RENTAL	1-2	1 1/8	0	0.0	N	ADDRESSOGRAPH-MULT	10-15	13 3/8	+7/8	+7.0	O	BALTIMORE BUS FORMS	2-4	1 7/8	0	0.0										
A	DCL INC	1-2	1 7/8	0	0.0	O	ADVANCED MEMORY SYS	7-9	7 3/8	-1/8	-1.6	A	BARRY WRIGHT	10-14	13 3/4	+1/4	+1.8										
N	DPF INC	6-9	7 7/8	-1/8	-1.5	N	AMPEX CORP	8-11	10 1/8	+5/8	+6.5	O	CYBERMATICS INC	1-1	1	+1/8	+14.2										
N	ITEL	13-20	19 1/8	+1 1/8	+6.2	O	ANDERSON JACOBSON	3-5	4	-1/8	-3.0	O	DUPLEX PRODUCTS INC	14-19	17 1/8	-1/2	-2.8										
N	LEASCC CORP	19-27	24 3/4	-3/8	-1.4	N	APPLIED DIG DATA SYS	10-16	13 5/8	-1/2	-3.5	N	ENKIS BLS. FORMS	6-7	6 1/8	0	0.0										
O	LEASPC CORP	1-2	1	-1/4	-20.0	O	BEEHIVE INT'L	8-12	8 3/4	0	0.0	O	GRAHAM MAGNETICS	11-16	16 3/8	+1/8	+0.7										
O	NRG INC	0-1	1 1/4	0	0.0	A	BOLY, BERANEK & NEW	7-8	8	0	0.0	O	GRAPHIC CONTROLS	15-18	16	-1/2	-3.0										
A	PIONEER TEX CORP	5-11	5 3/4	0	0.0	N	BUNKER-RAND	8-12	11 3/4	+4/8	+1.0	N	3P COMPANY	48-56	49 3/4	-3/8	-0.7										
A	U.S. LEASING	10-15	14 3/4	-1/8	-0.8	A	CALCOMP	3-5	2 7/8	+1/8	+4.5	O	MCORE CORP LTD	26-37	27	+3/4	+2.8										
SUPPLIES & ACCESSORIES														O	NASHUA CORP	16-25	24	+1 3/4	+7.8								
EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH														O	STANDARD REGISTER	18-25	21 1/2	-1/4	-1.1								
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER														O	TAB PRODUCTS CO	13-19	17 1/4	0	0.0								
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID														N	UARGO	19-22	20 1/2	-1/4	-1.2								
(1) TO NEAREST DOLLAR														A	WABASH MAGNETICS	10-15	12 1/2	-1/8	-0.9								
														N	WALLACE BLS FORMS	17-21	18 3/4	-1/2	-2.5								

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